Printed Pages : 2 **Roll No.** | | | | | | | | | | | **ECS088**

B.TECH.

THEORY EXAMINATION (SEM–VIII) 2016-17

SOFT COMPUTING

Time : 3 Hours ***Max. Marks : 100***

Note : *Be precise in your answer. In case of numerical problem assume data wherever not provided.*

SECTION-A

1 Explain the following : (10×2=20)

a) Compare and contrast biological neuron and artificial neuron.

b) Define Soft Computing. How is it different from conventional computing?

c) If the inputs are given as x1=0.55,x2=0.10,x3=0.33 and the corresponding weights asw1=0.10,w2=0.20,w3=0.80,what will be the value of signum function?(assume value of theta as 0.5).

d) What is difference between auto associative memory and hetero associative Memory?

e) Explain any three methods involved in defuzzification.

f) Give the difference between supervised and unsupervised learning in artificial neural network?

g) Define an artificial neural network. State the characteristics of an artificial neural network

h) Describe what is likely to happen when a learning rate is used that is too large, and when one is used that is too small. How can one optimize the learning rate?

i) Explain binary encoding in genetic algorithm

j) How can Fitness functions be found for any optimization problem? Explain, in detail, Fitness Function in Genetic algorithm.

SECTION-B

2 Attempt any five of the following : (10×5=50)

(a) **i.** Use the Hebb rule of discrete BAM, find the weight matrix to store the following (binary) input output pattern paris.

S(1)=(1,1,0) t(1)=(1 0)

S(2)=(0,1,0) t(2)=(0,1)

ii. Define delta rule. Explain significance of delta rule in defining the weights.

(b) What is the method of Backpropagation Learning? List all the tuning parameters of Back-propagation Neural Network. Explain the selection criteria of various parameters in BPN.

(c) **i**. Explain the architecture of Adaptive Linear Neural Element Network (ADALINE) and Many ADALINE (MADALINE) Network.

ii. A neuron j receives inputs from other neurons whose activity levels are 10, -20, 4 and -2. The respective synaptic weights of the neurons are 0.8, 0.2,-1.0 and 0.9. Calculate the output of neuron j for the following situation

i. The neuron is linear

ii. The neuron is represented by McCulloch-Pits model, defined as follows:

$Y_K = \begin{cases} 1, if V_K \geq 0 \\ -1, if V_K < 0 \end{cases}$ where V_k is the included local field.

(d) **i.** Name all types of error based learning algorithms. Define Gradient descent learning.

ii. Explain what the Perceptron Learning Rule is, and discuss its advantages and disadvantages over attempting to compute decision boundaries analytically.

(e) Let X = {a,b,c,d} Y={1,2,3,4} And the three fuzzy sets be given as

$\tilde{A}$ = { (a,0) (b,0.8) (c,0.6) (d,1)}

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

$\tilde{C}$ = { (1,0) (2,0.4) (3,1) (4,0.8)}

Determine the implication relation

i. if x is $\hat{A}$ then y is $\tilde{B}$

ii.if x is $\hat{A}$ then y is $\tilde{B}$ else y is $\tilde{C}$

(f) Let sets of values of variables X and Y be X={x_1, x_2 ,x_3} and Y= { y_1 , y_2 }, respectively. Assume that a proposition "if X is A, Then Y is B" is given where A=.3/ x_1 + 1/ x_2 + .6/ x_3 and B= .1/ y_1 + .4/ y_2. Then given a fact expressed by the proposition " X is A' ", where A'= .4/ x_1 + .7/ x_2 + .9/ x_3 .

Use the generalized Modus ponens to derive a conclusion in the form " Y is B' "

(g) Write short notes on any two of the following :

i). Types and features of membership functions in Fuzzy Logic

ii). Fuzzy quantifiers, modifiers in linguistic hedges

iii). Fuzzy Inference System

(h) How can Fitness functions be found for any optimization problem? Maximize the function $f(x)=x^2$, with x in the integer interval [0,31) with the help of Genetic Algorithm

SECTION-C

Attempt any two of the following : **(15×2=30)**

3 (a**).** Discuss in details operations and properties of fuzzy sets. Why law of contradiction and law of exclusive middle are violated in fuzzy set theory under the standard fuzzy set operations. What is the significance of this?

(b). Let X = {x1,x2,x3}, Y= {y1,y2}, Z= {z1,z2,z3}.

Let R be a fuzzy relation:

	y1	y2
x1	0.3	0.1
x2	0.2	0.7
x3	0.5	0.4

Let S be a fuzzy relation:

	z1	z2	z3
y1	0.5	0.5	0.5
y2	0.5	0.8	0.9

Determine the matrix for RoS by max-min composition.

4 What is Fuzzy system? Explain fuzzification. Design a Fuzzy Cruise controller or Air conditioner controller and demonstrate its working. Make the assumptions of values as per your requirement

5 Write short notes on any three of the following :-

a) Procedures of GA
b) Genetic Representations
c) Mutation and Mutation rate
d) Convergence of genetic algorithm