(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0935 Roll No. | | | | | | | | | | |

B. Tech.

(SEM. IV) THEORY EXAMINATION 2010-11

INTRODUCTION TO SOFT COMPUTING

(Neural Networks, Fuzzy Logic and Genetic Algorithm)

Time : 3 Hours *Total Marks : 100*

Note : (1) Attempt **all** questions.

(2) Make suitable assumptions wherever necessary.

1. Attempt any **four** parts of the following : **(5×4=20)**

(a) Define an artificial neural network. State the characteristics of an artificial neural network.

(b) Briefly discuss the common application domains of an artificial neural network.

(c) Define learning. Discuss the different learning methods in brief.

(d) Construct a recurrent network with four input nodes, three hidden nodes and four output nodes that has lateral inhibition structure in the output layer.

(e) What is the necessity of activation function ? List the commonly used activation functions.

(f) What is an auto-associative memory network ? Explain.

2. Attempt any **two** parts of the following : **(5×4=20)**

(a) (i) Explain the major features of single layer perception.

(ii) How hidden layer computation is done in back propagation learning ? Explain.

(b) (i) Describe the multilayer perception model.

(ii) What is the significance of error signal in perceptron network ? Explain.

(c) (i) Discuss the some application areas of back propagation networks.

(ii) Discuss the factors affecting the training of back propagation training.

3. Attempt any **two** parts of the following : **(10×2=20)**

(a) Explain the term fuzzy sets and fuzzy logic. Compare and contrast classical logic and fuzzy logic.

(b) The task is to recognize English alphabetical characters (F, E, X, Y, I, T) in an image processing system. Two fuzzy sets I and F are defined to represent the identification of characters I and F.

I = {(F, 0.4), (E, 0.3) (X, 0.1), (Y, 0.1), (1, 0.9), (T,0.8)}

F = {(F, 0.99), (E, 0.8), (X,0.1), (Y, 0.2), (1,0.5), (T, 0.5)}

Find the following :

(i) $I \cup F$ (ii) $(I - F)$ (iii) $F \cup F^c$ (iv) Verify de Morgan's law.

(c) Write short notes on the following :

(i) Fuzzy relations (ii) Fuzzy to crisp conversion.

4. Attempt any **two** parts of the following: **(10×2=20)**

(a) 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 :

(i) IF x is A THEN y is B.

(ii) IF x is A THEN y is B ELSE y is C.

(b) Define the membership function. Using your own intuition, plot the fuzzy membership function for the age of people.

(c) 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 athat a proposition "if X is a , Then Y is B" is given, where $A = .5/x_1 + 1/x_2 + .6/x_3$ and $B = 1/y_1 + .4/y_2$. Then, given a fact expressed by the proposition "x is A' ",where $A' = .6/x_1 + .9/x_2 + .7/x3$. use the generalized modus ponens to derive a conclusion in the form "Y is B'".

5. Write short notes on any **four** of the following : **(5×4=20)**

(a) Procedures of GA.

(b) Genetic representations.

(c) Mutation and Mutation rate.

(d) Generational cycle of GA.

(e) Applications of GA.