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

PAPER ID : 199407 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. IV) THEORY EXAMINATION 2013-14

INTRODUCTION TO SOFT COMPUTING (NEURAL NETWORKS, FUZZY LOGIC & GENETIC ALGORITH)

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 properties of the processing element of an artificial neural network.

(b) Compare and contrast biological neuron and artificial neuron.

(c) What is meant by learning ? How is supervised learning different from unsupervised learning ?

(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 hetero-associative memory network ? Explain.

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

(a) Discuss the different features of single layer perception.

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

(c) Write down the advantages and disadvantages of back propagation networks.

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

(e) State the importance of back propagation algorithm.

(f) Discuss some application areas of back propagation networks.

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

(a) Define fuzzy sets. Explain why the law of contradiction and the law of exclusive middle are violated in fuzzy set theory under the standard fuzzy sets operations. What is the significance of this ?

(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.

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

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

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

(b) Define the membership function and state its importance in fuzzy logic. Also discuss the features of membership functions.

(c) Define the defuzzification. What are the different methods of defuzzification process ? Discuss one method in detail.

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) Convergence of genetic algorithm.

(e) Applications of GA.