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

Time: 3 Hours   *Total Marks: 70*

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

SECTION A

1.   **Attempt *all* questions in brief.**   **2 x 7 = 14**

   a. How soft computing is different from conventional computing?
   b. Why sigmoid function is so important activation function in neural network?
   c. Whether the Hebbian learning rule is an example of unsupervised learning or not, justify your answer?
   d. Give name of the tuning parameters of Back-propagation neural network.
   e. Let A and B be the two fuzzy sets given by: A= {(x_1, 0.4), (x_2, 0.7), (x_3, 0.6)}, B= {(x_1, 0.5), (x_2, 0.3), (x_3, 0.1)}. Find the membership value of x1 and x2 in A∩B.
   f. Draw fuzzy membership function to describe cold, warm and hot water.
   g. Describe in brief tree encoding in GA.

SECTION B

2.   **Attempt any *three* of the following:**   **7 x 3 = 21**
   a. Explain the structure of a biological neuron with the help of diagram.
   b. Discuss how learning rule coefficient affects the Back propagation training.
   c. Consider three fuzzy sets given by:
        A = { (low, 1), (medium, 0.2), (high, 0.5) }
        B = { (positive, 0.9), (zero, 0.4), (negative, 0.9) }
        C = { (low, 0.1), (medium, 0.2), (high, 0.7) }
       i) Find the fuzzy relation for the Cartesian product of A and B.
       ii) Find CoR using max-min composition.
   d. Describe the following:
         i) Fuzzy set properties.
         ii) Lingustic variable & Membership function
   e. What are the benefits of using G.A.? what are its limitations?

SECTION C

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

   (a) Differentiate between heteroassociative and autoassociative memory.
   (b) What is neural network architecture? Explain the different type of neural network architectures.

4.   **Attempt any *one* part of the following:**   **7 x 1 = 7**
   (a) Explain single layer and multilayer perceptron neural network.
   (b) Write the algorithm for Backpropagation training method.

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

(a) Define a fuzzy set. How it is different from a crisp set?

(b) What do you mean by fuzzy relation explain with the help of an example.
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.

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

(a)Define the defuzzification. Explain different methods of defuzzification process?

(b) Explain the working of any one fuzzy controller.

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

(a) Discuss crossover operation in Genetic algorithm and its type.

(b) Explain the applications of G.A. in general life.