

Registration No. :

Total number of printed pages – 2

B. Tech
PCIT 4401

Seventh Semester Back Examination – 2014

PRINCIPLES OF SOFT COMPUTING

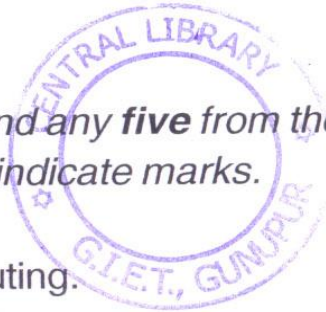
BRANCH : CSE

QUESTION CODE : L 172

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory and any **five** from the rest.
The figures in the right-hand margin indicate marks.



1. Answer the following questions : 2×10
- (a) State the important properties of soft computing.
 - (b) What is simple Artificial Neuron ?
 - (c) Find bandwidth of fuzzy set A, where $\mu_A = \text{trapezoid}(x ; 20, 30, 40, 70)$.
 - (d) Define T-norm operator.
 - (e) What is the difference between probability and fuzzy logic ?
 - (f) What is crossover operation in GA ?
 - (g) What is Support and α -cut of a fuzzy set ?
 - (h) Explain extension principle with example.
 - (i) What are the disadvantages of Artificial Neural Networks ?
 - (j) How Artificial Neurons learns ?
2. Two fuzzy relations are given by
- $$R = \begin{matrix} & y_1 & y_2 \\ x_1 & \begin{bmatrix} 0.6 & 0.3 \end{bmatrix} \\ x_2 & \begin{bmatrix} 0.2 & 0.9 \end{bmatrix} \end{matrix}$$
- $$S = \begin{matrix} & z_1 & z_2 & z_3 \\ y_1 & \begin{bmatrix} 1 & 0.5 & 0.3 \end{bmatrix} \\ y_2 & \begin{bmatrix} 0.8 & 0.4 & 0.7 \end{bmatrix} \end{matrix}$$
- (a) Find the max-min composition. 5
 - (b) Find the max-product composition. 5

3. (a) Enumerate the steps followed in genetic algorithm. 5

(b) Explain the following encoding technique with suitable examples : 5

 - (i) Binary encoding
 - (ii) Permutation encoding.

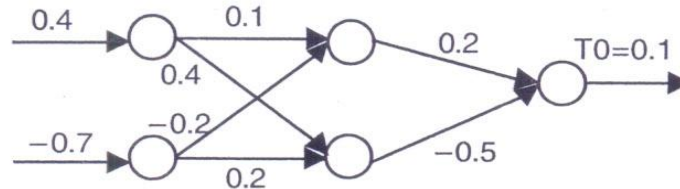
4. What do you mean by Defuzzification ? Explain, the following defuzzification methods : 10

 - (a) Centroid of area
 - (b) Bisector of area

P.T.O.

- (c) Mean of maximum
- (d) Smallest of maximum
- (e) Largest of maximum.

5. (a) Write the back propagation learning algorithm. 5
 (b) Update the weights of the following ANN model using back propagation training. Input layer uses linear transfer function, others use sigmoidal function. Assume the values of learning parameter to be 0.7 and the momentum coefficient to be 0.6. The first input is [0.4, -0.7] and the target $T_0 = 0.1$. 5

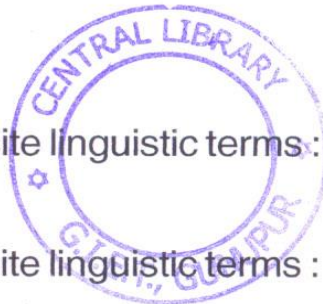


6. The membership functions for the linguistic terms hot and cold are given as

$$\mu_{\text{hot}}(x) = \text{bell}(x; 30, 3, 100) = \frac{1}{1 + \left(\frac{x - 100}{30}\right)^6}$$

$$\mu_{\text{cold}}(x) = \text{bell}(x; 20, 2, 0) = \frac{1}{1 + \left(\frac{x}{20}\right)^4}$$

- (a) Construct MFs for the following composite linguistic terms: 5
 (i) More or less hot, very cold
 (ii) Not cold and not too hot.
 (b) Construct MFs for the following composite linguistic terms: 5
 (i) Cold but not too cold
 (ii) Extremely hot.



7. Following nonlinear problem needs to be solved by GA. It is decided to find three decimal places of accuracy.

$$\text{Minimize } (x_1 - 2.5)^2 + (x_2 - 5)^2$$

$$\text{Such that } 5.5x_1 + 2x_2 - 18 \leq 0 \text{ and } 0 \leq x_1, x_2 \leq 5$$

- (a) Find the chromosome length of individual in the population of GA. 5
 (b) What will be the fitness function? 5
 8. Write short notes on any **two** of the following: 5×2
 (a) Synapses, Dendrite, Hillock, Axon and Soma
 (b) Competitive and Recurrent network
 (c) Self organizing and Reinforcement training
 (d) Activation Function.