BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI (END SEMESTER EXAMINATION)

CLASS: BE **SEMESTER: VII** BRANCH: **CSE** SESSION: MO/19

SUBJECT: CS5105 SOFT COMPUTING

TIME: 3:00 HOURS **FULL MARKS: 60**

INSTRUCTIONS:

- 1. The question paper contains 7 questions each of 12 marks and total 84 marks.
- 2. Candidates may attempt any 5 questions maximum of 60 marks.
- 3. The missing data, if any, may be assumed suitably.
- 4. Before attempting the question paper, be sure that you have got the correct question paper.
- 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

- Q.1(a) What is membership function? Explain.
- Q.1(b) What are alpha cut and its variation? Highlight the role of these in fuzzy logic.
- Q.1(c) Let A and B be two fuzzy sets defined as

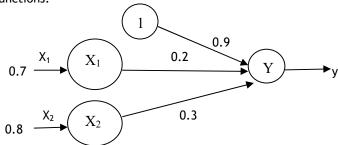
 $A = 1/x_1 + .7/x_2 + 9/x_3 + .8/x_4 + .9/x_5$, and $B = .9/x_1 + .9/x_2 + .2/x_3 + .1/x_4 + 1/x_5$

Find (a) B-A (b) A \cup B (c) \cdot^7 (A \cap B) (d) S(A,B) (e) d(A,B) (f) A-B

- Q.2(a) What is extension principle for fuzzy sets? Explain with the help of example.
- Q.2(b) Let A and B be two fuzzy numbers defined as
- - 0 for $x \le -1$ and x > 3 $A(x) = \begin{cases} 0 & \text{for } x \le -1 \text{ and } x > 3 \\ (x + 1) / 2 & \text{for } -1 < x \le 1 \\ (3 - x) / 2 & \text{for } 1 < x \le 3 \end{cases}$ $B(x) = \begin{cases} 0 & \text{for } x \le 1 \text{ and } x > 5 \\ (x - 1) / 2 & \text{for } 1 < x \le 3 \\ (5 - x) / 2 & \text{for } 3 < x \le 5 \end{cases}$

Find (a) (A. B)(x) [multiply] (b) (A/B)(x)

- Q.3(a) What is defuzzification? Why it is needed?
- [5] Differentiate between Centroid method and Centre of Sums method of defuzzification with example. [7] Q.3(b)
- Q.4 Let the initial population be 0 1 1 0 0, 1 1 0 0 1, 0 0 1 0 1, 1 0 0 1 1. Maximize the function $f(x) = x^2$ [12] Where x is permitted to vary between 0 and 31.
- Q.5(a) Compare and contrast biological neuron and artificial neuron. [2]
- Q.5(b)In what ways bipolar representation better than binary representation. Elaborate with example. [4]
- Q.5(c) Implement AND function using McCulloch-Pitts neuron by taking binary data.
- Q.6(a)What is meant by unsupervised learning? Explain.
- Q.6(b)How is a Madaline network formed? Elaborate with example.
- Q.6(c)Calculate the output of neuron Y for the net shown below. Use binary and bipolar sigmoidal activation functions.



- Define with example the Euclidean distance. [2]
- Draw and explain the model of Adaline network. 0.7(b)
- Implement ANDNOT function using McCulloch-Pitts neuron using binary data representation.

[4]

[6]

[4]

[2]

[4]

[6]