

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

**CLASS: BE  
BRANCH: IT**

**SEMESTER : V  
SESSION : MO/19**

**SUBJECT: IT5025 PRINCIPLE OF SOFT COMPUTING**

**TIME: 3 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) Explain why we need fuzzy set theory. [2]

Q.1(b) Explain why the law of contradiction and law of excluded middle are violated in fuzzy set theory under the standard fuzzy sets operations. What is the significance of this? [4]

Q.1(c) Let A and B be two fuzzy sets defined as [6]  
 $A = .1/x_1 + .5/x_2 + 1/x_3 + .9/x_4 + 1/x_5$ , and  
 $B = .9/x_1 + .4/x_2 + .2/x_3 + 1/x_4 + 1/x_5$   
 Find (a)  $B-A$  (b)  $S(A, B)$  (c)  $\bar{A} \cap B$

Q.2(a) Suppose the form of the equation is [6]  
 $A + X = B$ , and

Let A and B in the equation be the following fuzzy numbers:  
 $A = .2 / [0,1) + .6 / [1,2) + .8 / [2,3) + .9 / [3,4) + 1 / 4 + .5 / (4,5) + .1 / (5,6]$   
 $B = .1 / [0,1) + .2 / [1,2) + .6 / [2,3) + .7 / [3,4) + .8 / [4,5) + .9 / [5,6) + 1 / 6 + .5 / (6,7) + .4 / (7,8) + .2 / (8,9) + .1 / (9,10]$   
 Find the value of X.

Q.2(b) Let A and B be two fuzzy numbers defined as [6]

$$A(x) = \begin{cases} 0 & \text{for } x \leq -1 \text{ and } x > 3 \\ (x + 1) / 2 & \text{for } -1 < x \leq 1 \\ (3 - x) / 2 & \text{for } 1 < x \leq 3 \end{cases}$$

$$B(x) = \begin{cases} 0 & \text{for } x \leq 1 \text{ and } x > 5 \\ (x - 1) / 2 & \text{for } 1 < x \leq 3 \\ (5 - x) / 2 & \text{for } 3 < x \leq 5 \end{cases}$$

Find (a)  $(A - B)(x)$  (b)  $(A * B)(x)$

Q.3(a) What are different fuzzy propositions? Elaborate all of them with respective suitable examples. [8]

Q.3(b) Explain Centroid method and Centre of Sums method of defuzzification with example. [4]

Q.4(a) What are different methods for selecting chromosomes for parents to crossover? Elaborate any two [6]

Q.4(b) What is Genetic algorithm cycle? Explain them with the help of examples. [6]

Q.5(a) What is the necessity of activation function? Explain. [2]

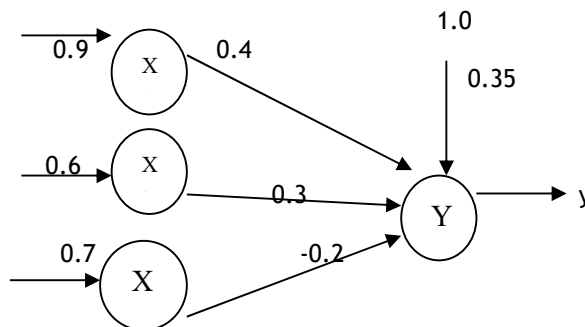
Q.5(b) How does a momentum factor make faster convergence of a network? Elaborate. [4]

Q.5(c) Differentiate between supervised learning and unsupervised learning. [6]

Q.6(a) What is learning rate parameter? Elaborate. [2]

Q.6(b) Draw the architecture of Mexican hat and state its activation function. [4]

Q.6(c) [6]



Obtain the output of the neuron Y for the network shown in above figure using (i) binary sigmoidal and (ii) bipolar activation function.

- Q.7(a) What is Hamming net? Discuss. [2]  
Q.7(b) What is Kohonen self - organizing maps? State the applications of this. [4]  
Q.7(c) Implement ANDNOT function using McCulloch-Pitts neuron using binary data representation. [6]

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