

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

**CLASS: M.TECH  
BRANCH: RS**

**SEMESTER : I  
SESSION : MO/19**

**SUBJECT: CS524 SOFT COMPUTING**

**TIME: 3:00 HOURS**

**FULL MARKS: 50**

**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
  2. Attempt all questions.
  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 handbook/Graph paper etc. to be supplied to the candidates in the examination hall.
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Q.1(a) Why we need fuzzy set theory? 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? [5]

Q.1(b) Let A and B be two fuzzy sets defined as [5]  
 $A = .8/x_1 + .7/x_2 + 1/x_3 + .9/x_4 + .9/x_5$ , and  
 $B = .9/x_1 + .4/x_2 + .2/x_3 + .6/x_4 + 1/x_5$   
 Find (a)  $B-A$  (b)  $A \cup B$  (c)  $\bar{A} \cap B$  (d)  $S(A,B)$  (e)  $d(A,B)$

Q.2(a) Let the values of the variables X and Y be  $X = \{x_1, x_2, x_3\}$  and  $Y = \{y_1, y_2\}$ , respectively. The proposition given is "If X is A, then Y is B", where  $A = .5/x_1 + 1/x_2 + .6/x_3$  and  $B = 1/y_1 + .4/y_2$ . The fact is expressed by the proposition "X is A' " where  $A' = .6/x_1 + .9/x_2 + .7/x_3$ . [5]  
 Use the generalized Modus Ponens to derive the conclusion in the form "Y is B' ".

Q.2(b) Let A and B be two fuzzy numbers defined as [5]  

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

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

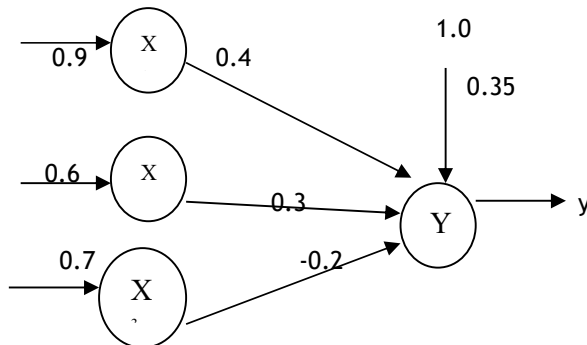
Find (a)  $(A - B)(x)$  (b)  $(A/B)(x)$

Q.3(a) What are different methods for selecting chromosomes for parents to crossover? Elaborate any two. [5]

Q.3(b) What are stopping conditions for Genetic algorithm flow? Explain them with the help of examples. [5]

Q.4(a) What are basic models of an artificial Neural Networks? Explain them with the help of examples. [5]

Q.4(b) [5]



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

Q.5(a) With a neat flowchart, explain the training process of perceptron network. [4]

Q.5(b) Using Linear separability concept, obtain the response for OR function by taking bipolar inputs and bipolar targets. [6]