1058
B.E. (Information Technology)
Eighth Semester
Elective – III
ITE-845: Soft Computing

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt *five* questions in all, including Question No. I which is compulsory and selecting two questions from each Section.

x-x-x

1. Answer the following: (1x10)
   a) Define fuzzy sets with discrete universe and continuous universe.
   b) If the value of membership function of 'a' set A is 0.8 what is the value of membership function of 'a' to set not A.
   c) How are the learning methods classified? Give examples.
   d) Explain linear separability with help of an example.
   e) What are Fuzzy Inference Systems? List its types.
   f) Differentiate between Fuzzy sets and Traditional sets.
   g) Define binary fuzzy relation
   h) Explain the concept of feedback in ANNs.
   i) List two limitations of Genetic Algorithms.
   j) Explain the term Phenotype as used in Genetic Algorithm.

SECTION – A

2. (a) What are the shortcomings of the basic neuron model for ANNs? Discuss all models proposed thereafter to overcome these problems. (5)

   (b) Using block diagram explain fuzzy logic controller. (5)

3. Find the new weights using back propagation algorithm when the network illustrated in the figure is presented the input pattern [0.6 0.8 0] and target output is 0.9. Use learning rate 0.3 and use binary sigmoid activation function (10)
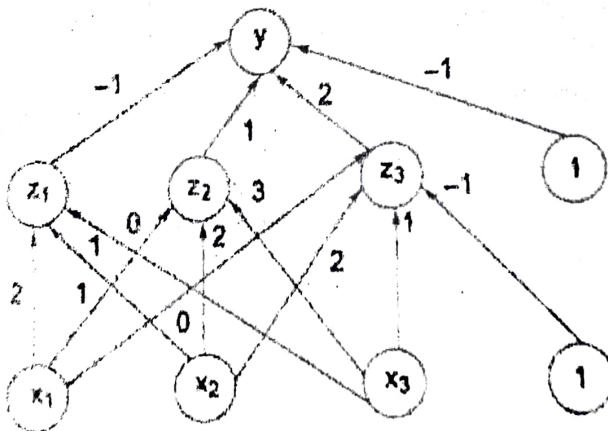
4. (a) Draw an Architecture of McCulloch-Pitts neuron. Realize the Ex-OR function using McCulloch-Pitts neuron. (8)

   (b) Given a Fuzzy set A= {(1, .2), (2, .4), (3, .6), (4, .8), (5, 1)}. Find the cardinality of A and A^c. (2)

P.T.o.

SECTION – B

5. (a) Define the terms chromosome, fitness function, crossover and mutation as used in genetic algorithms. (5)

(b) Obtain the off spring chromosome(s), it will produce from the reproduction of three parent chromosomesP1,P2 and P3 following the "Three parent crossover" technique: (5)

P₁:

1	1	0	1	0	0	0	1

P₂:

0	1	1	0	1	0	0	1

P₃:

0	0	1	1	0	1	1	0

6. (a) What is the use of selection operation in Genetic algorithm? (2)

(b) Mention four criteria, which you should consider to judge the efficiency of a selection strategy? (4)

(c) Precisely state the two major steps in Tournament selection strategy. (4)

7. Suppose a genetic algorithm uses chromosomes of the form x = abcdefgh with a fixed length of eight genes. Each gene can be any digit between 0 and 9. Let the fitness of individual x be calculated as:

$$f(x) = (a + b) - (c + d) + (e + f) - (g + h),$$

and let the initial population consist of four individuals with the following chromosomes:

    x1 = 6 5 4 1 3 5 3 2
    x2 = 8 7 1 2 6 6 0 1
    x3 = 2 3 9 2 1 2 8 5
    x4 = 4 1 8 5 2 0 9 4

Evaluate the fitness of each individual, showing all your workings, and arrange them in order with the fittest first and the least fit last. (10)

×—×—×