Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.TECH(EEPS)/SEM-1/PSM-104(A)/2011-12

2011

SOFT COMPUTING TECHNIQUES

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer Question No.**1** and any *four* from the rest.

1. State whether the following statements are true or not. Justify your answer : 7 × 2 = 14

   a) Fuzzy logic controllers are not dependent on accurate mathematical models.

   b) Networks with biases can represent relationships between inputs and outputs more easily than networks without biases.

   c) As the value of α increases from 0 to 1 the size of α cuts also increases.

   d) Like conventional set, a fuzzy set can be used to describe the value of a variable.

   e) Fuzzy relation inferences are computational procedures used for evaluating fuzzy linguistic descriptions.

f) Genetic algorithm is a better choice for optimization problem as compared to gradient based searching method.

g) Genetic algorithm is inspired by natural biological evaluation.

2. a) What is Evolutionary Computation ? 2

b) Briefly describe the process of genetic algorithm in the context of evolutionary computation. 5

c) Briefly explain various techniques of crossover operator in genetic algorithm. 2

d) How can genetic algorithm be used for optimization problem ? 5

3. a) What is fuzzy relation ? What is the difference between classical relation of fuzzy relation ? 6

b) Discuss fuzzy propositions. 4

c) What are normal fuzzy set and fuzzy singleton ? 4

4. a) State and explain extension principle. 4

b) What do you mean by membership function in fuzzy logic ? What is interval valued fuzzy set ? 6

c) Define concentration and dilation with reference to fuzzy set. 4

5. a) What is the difference between Supervised Learning and Reinforcement Learning ? 6

b) Develop a perceptron for the AND function with bipolar inputs and targets. 8

6. a) What are the different types of activation functions in ANN ? 5

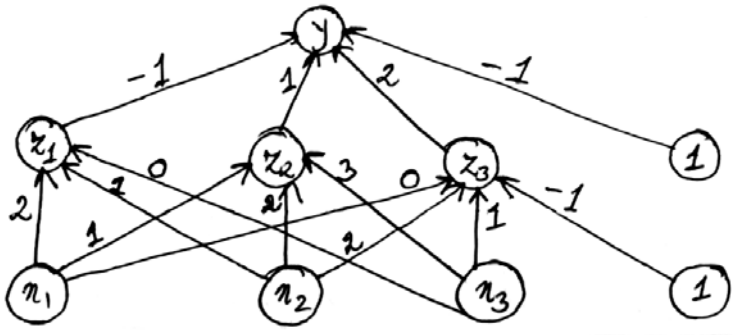
   b) What is feed forward neural network ? 4

   c) Describe how the error signal is propagated back to the neurons in backpropagation learning. 5

7. a) Describe Kohonen Self Organizing Map. 4

   b) Consider a Kohonen net with two cluster units and three input units. The weight vector for the cluster unit are (0·9, 0·7, 0·6) and (0·4, 0·3, 0·5). Find the winning cluster unit C_J for the input vector (0·4, 0·2, 0·1). Use learning rate of 0·2. Find the new weights for the winning unit. Find new weights for C_{J-1} and C_{J+1} if they are allowed to learn. 10

8. Find the new weights when the network shown in the figure is presented the input pattern [0·6 0·8 0] and target output is 0·9. Use learning rate $\alpha = 0 \cdot 3$ and use binary sigmoid activation function. 14



A Backpropagation Net

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