Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)
MAKE UP EXAMINATIONS, JANUARY 2023

SOFT COMPUTING TECHNIQUES [ELE 4062]

REVISED CREDIT SYSTEM

Time: 3 Hours **Date: 05 January 2023** **Max. Marks: 50**

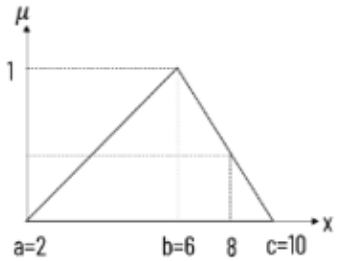
Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitably assumed.

1A. Design McCulloch-Pitts neural network model for OR function considering bipolar data. Assume initial weights and bias to be zero. ***(04)***

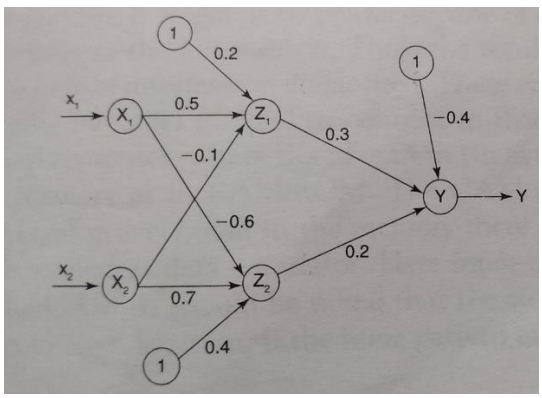
1B. Design a Hebb net to implement the logical OR function. Assume initial weights and bias to be zero. Determine the final weights and bias values. Assume binary inputs and targets. Draw the decision boundary lines for each training pair. ***(04)***

1C.



Determine the membership value for X=8. ***(02)***

2A. Using back propagation algorithm determine i) output ii) the error portions between hidden & output layer and input &hidden layer iii) change in weights between hidden and output layer for the network shown below. The network is presented with the input pattern [x1 x2]=[1, -1] and target output is 1. Using learning rate of α=0.2 and binary sigmoidal activation function.



(06)

2B. List any two properties of Fuzzy sets. ***(02)***

2C. Write a note on Gaussian membership function with a suitable example. ***(02)***

3A. Discuss various membership value assignment techniques. ***(05)***

3B. X={ 0.2, 0.3, 0.4} Y={0.4, 0.2} Z={0.1, 0.9, 0.2}

Obtain Fuzzy Cartesian product between X and Y
Obtain Fuzzy Cartesian product between Y and Z
Obtain the Fuzzy relation between i) and ii) ***(03)***

3C. Using intuition, plot the fuzzy membership for the age of people aged between the range of 0 to 60 years. Use a triangular membership function with 4 descriptors. ***(02)***

4A. The task is to recognize English alphabet characters (M, A, N) in an image processing system. The fuzzy sets are defined as below.

M={0.9, 0.2, 0.6}

A={0.2,0.95,0.5}

N={0.65,0.3,0.98}

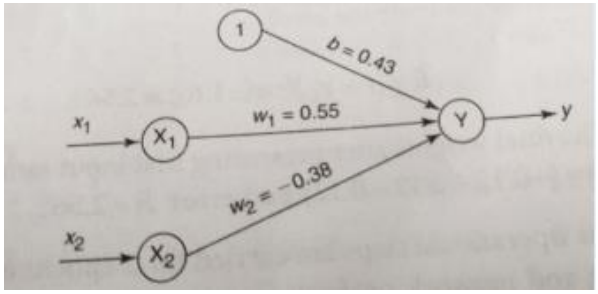
Obtain {MUAUN}, {M-N}, {MUA'} ***(03)***

4B. Design of a fuzzy controller for a steam turbine using the following data:

Assume the input of the fuzzy controller as temperature and pressure. The output will be the throttle setting of a steam turbine. Use 3 descriptors for input and 5 descriptors for output variables. Derive the set of rules for controller action and get the defuzzified values.

Assume that the current temperature is 30% and pressure is 40% and we have to determine the throttle position of the turbine for this particular condition ***(05)***

4C. For the ADALINE network, initial weights are as shown. The learning rate is 0.2 and target output is 1. Determine the error after [x1 x2]=[1 1] is given ?



(02)

5A. Discuss the main operators of Genetic Algorithm. ***(03)***

5B. Using Genetic algorithm maximize f(x)= x^2 over 0 to 31 with initial population { 6, 12. 25, 3}. Perform two iterations. ***(05)***

5C. Compare GA with traditional Optimization Techniques. ***(02)***