Student Exam No. _____

GANPAT UNIVERSITY

B. Tech. Semester: VIII (Electrical) Engineering

Regular Examination April – June 2015

2EE831: Artificial Intelligence

Time: 3 Hours **Total Marks: 70**

Instruction: 1 Attempt all questions.
2 Make suitable assumptions wherever necessary.
3 Figures to the right indicate full marks.

Section - I

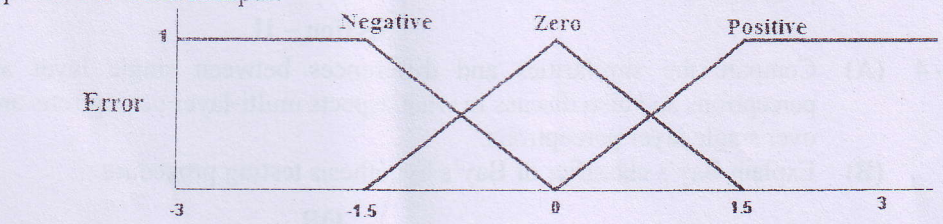
Que. – 1 **(A)** How Artificial Neural Network resembles brain? [2]

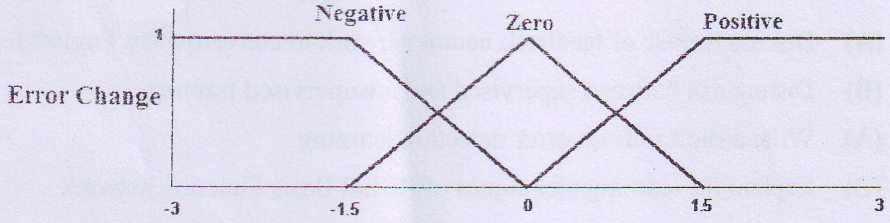
(B) The inputs to a Fuzzy Logic Controller are error [-3, 3] and error change [-3, 3] and the output is control input [-2, 2]. The values of these variables are shown in Figure. For an error of 0.375 and error change of -2.25 find the crisp value of the control input. [10]

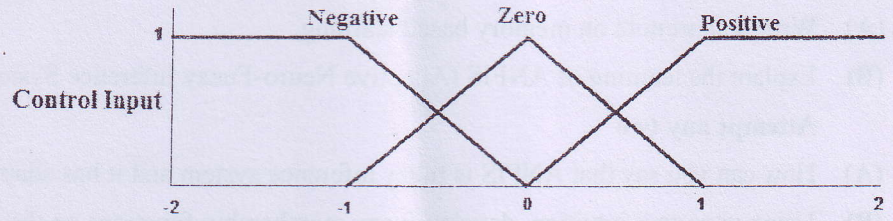
Use weighted average method for defuzzification. The rule base is given as

If the error is positive and error change is positive then control input is positive
If the error is negative or error change is zero control input is negative
If the error is zero and error change is negative control input is negative
If the error is not negative then the control input is zero
If the error positive and error change is zero control input is positive

Show your computations clearly for each of the four tasks involved in finding the crisp value of control input.







OR

Que. – 1 **(A)** What do you understand by the term: Learning, Generalization, Function approximation in context of ANN. [6]

(B) What are the basic learning laws? Explain the weight updating rules in each learning law. [6]

Que. – 2 (A) What is back propagation? Derive its learning algorithm with a schematic two-layer feed forward neural network. [8]

(B) Write about linearly separable patterns and non-linearly separable patterns in single layer perceptron with an example. [3]

OR

Que. – 2 (A) There are two training sets given below. [9]

Sr. No.	Inputs		Output
	X1	X2	O
1	0.4	-0.7	0.1
2	0.3	-0.5	0.05

Consider neural network which has three layers and there are three neurons in input layer, two neurons in hidden layer, and one neuron in output layer. Consider the random nonzero values for initial values of weights.
Update the weights of this neural network using Backpropagation algorithm.

(B) Compare the radial basis function network with multi layer perceptron. [2]

Que. – 3 **Attempt any two**

(A) A Hopfield network made up of three neurons, which is required to store the following three fundamental memories: [6]
$X_1 = [-1, -1, -1]^T$ $X_2 = [+1, -1, -1]^T$ $X_3 = [+1, +1, +1]^T$
Evaluate the 3-by-3 synaptic weight matrix of the network.

(B) How instantaneous mode and batch mode of training can affect the result of back propagation learning? [6]

(C) What are fuzzy relations? Explain the operations on fuzzy relations. Explain the properties of fuzzy relations. [6]

Section – II

Que. – 4 (A) Compare the similarities and differences between single layer and multi-layer perceptrons and also discuss in what aspects multi-layer perceptrons are advantageous over single layer perceptrons. [6]

(B) Explain Bay's classifier or Bay's hypothesis testing procedure. [6]

OR

Que. – 4 (A) Discuss the use of feedback neural network to convert noisy English text to speech. [8]

(B) Distinguish between supervised and unsupervised training. [4]

Que. – 5 (A) Write a short note on error detection learning. [4]

(B) Explain the learning techniques of Radial Basis Function network. [7]

OR

Que. – 5 (A) Write a short note on memory based learning. [4]

(B) Explain the learning of ANFIS (Adaptive Neuro-Fuzzy Inference System). [7]

Que. – 6 **Attempt any two**

(A) How can you say that ANFIS is fuzzy inference system and it has adaptability? [6]

(B) Using your own intuition, develop fuzzy membership functions on the real line for the fuzzy number "near to zero", using the Symmetric triangle, Trapezoids, Gaussian functions, [6]

(C) Explain various defuzzification methods used in fuzzy logic controller and compare them. [6]

END OF PAPER