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**B.E / B.Tech ( Full Time ) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2014**

**ELECTRICAL AND ELECTRONICS ENGINEERING**

**VIII - Semester**

**EE9030 – SOFT COMPUTING**

**(Regulation 2008)**

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

**PART-A (10 x 2 = 20 Marks)**

1. Compare artificial neuron and biological neuron.
2. Implement a neural network for Exclusive – OR logic function.
3. What is reinforced learning?
4. What is ANN discrimination ability?
5. What is competitive learning?
6. Explain the fuzzy intersection operation with example.
7. What are the advantages of genetic algorithm over conventional methods?
8. What is uniform cross over in GA?
9. Why is normal random number used in evolutionary programming?
10. What are the advantages of fuzzy logic?

**Part – B ( 5 x 16 = 80 marks)**

11. Perform one training step of the back propagation network with single neuron using delta learning rule. Use the following two input and output patterns for training.

$$\left\{ X_1 = \begin{bmatrix} 2 \\ 1 \\ -1 \end{bmatrix}, d_1 = 2 \right\}, \left\{ X_2 = \begin{bmatrix} 1 \\ 2 \\ -1 \end{bmatrix}, d_2 = 3 \right\}$$

Assume the initial weight,  $W^o = [3 \ 2 \ 5]^T$  and  $\eta=0.6$ . Use bipolar sigmoid function.

Normalize the inputs and output by a factor of 10.

(16)

12. a) Consider the following three training pairs  $(a^{(i)}, b^{(i)})$ ;  $i=1,2,3$ , for BAM:

$$(a^{(1)}, b^{(1)}) = ([1 \ -1 \ -1 \ 1 \ -1]^t, [1 \ -1 \ -1]^t)$$

$$(a^{(2)}, b^{(2)}) = ([-1 \ 1 \ 1 \ 1 \ -1]^t, [-1 \ -1 \ -1]^t)$$

$$(a^{(3)}, b^{(3)}) = ([1 \ -1 \ 1 \ 1 \ 1]^t, [-1 \ 1 \ -1]^t)$$

Find the weight matrix  $W$  and determine the output while submitting the following input to the 'B' layer neurons:  $a^{(0)} = [1 \ -1 \ 1 \ -1 \ 1]^t$ . (16)

(OR)

- b) Describe the architecture of Hopfield neural network and explain the learning through simple example. (16)

13. a) Discuss the steps involved in the development of fuzzy logic system with suitable example. (16)

(OR)

- b) In the students evaluation system based on their GPA and GRE scores, there are three categories for each score as High (H), Medium (M) and Low (L). The decision should be Good (G), Fair (F), and Poor (P). The fuzzy variable range is given in the following table.

	Fuzzy variable range		
	L/P	M/F	H/G
GPA	5-8	6-9	7-10
GRE	600-1200	1000-1500	1300-1800
Decision	50-65	60-85	75-100

Use triangular membership function. Experts associate the decisions to the GPA and GRE score as given below.

GPA	L	M	L	H	L	M	M	H	H
GRE	L	L	M	L	H	M	H	M	H
Decision	P			F			G		

Evaluate a student with GPA and GRE scores of 8 and 1400 respectively. Use centroid method for defuzzification process. (16)

14. a) Explain the reproduction, crossover and mutation operators in genetic algorithm. Give suitable example for each process. (16)

(OR)

- b) Describe any one-optimization problem in your field and explain the algorithmic steps in detail to solve the same using evolutionary programming. (16)

15. a) Design a fuzzy logic controller for temperature control system. Give proper interpretation for the selection of fuzzy controller inputs and rules. (16)

(OR)

- b) Assume that you are an engineer assigned with the task of developing an ANN for peak load forecasting. Describe the step-by-step procedure for developing the ANN for peak load forecasting. (16)