Code No: 07A7EC01 **R07** **Set No. 2**

**IV B.Tech I Semester Examinations,MAY 2011**
**NEURAL NETWORKS AND FUZZY LOGIC**
**Common to Aeronautical Engineering, Instrumentation And Control Engineering, Electrical And Electronics Engineering**

**Time: 3 hours** **Max Marks: 80**

**Answer any FIVE Questions**
**All Questions carry equal marks**

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1. Explain the role of neural networks in Power System Planning. [16]
2. State and prove the perceptron convergence theorem. [16]
3. (a) Differentiate single layer and multilayer networks.
   (b) Generate the output of OR, NOT function using McCulloch-Pitts Neuron. [8+8]
4. (a) What is meant by uncertainty? What are various types of uncertainties? Explain the measures of uncertainty.
   (b) Describe the measures of Fuzziness and dissonance. [8+8]
5. (a) Discuss memory based learning in detail.
   (b) How is boundary region determined using linear seperability concept. [8+8]
6. Determine the weights of a network with 4 input and 2 output units using delta learning law with $f(a) = \frac{1}{1+e^{-a}}$ for the following input-output pairs:
   Input : $[1\ \ 1\ \ 0\ \ 0]^T\ \ [1\ \ 0\ \ 0\ \ 1]^T\ \ [0\ \ 0\ \ 1\ \ 1]^T\ \ [0\ \ 1\ \ 1\ \ 0]^T$
   Output : $[1\ \ 1]^T\ \ [1\ \ 0]^T\ \ [0\ \ 1]^T\ \ [0\ \ 0]^T$. [16]
7. (a) Using Predicate logic solve the following:
   All men are mortal
   Confucius is a man
   Prove : Confucius is mortal
   (b) Let X = {a,b,c,d} Y = {1,2,3,4}
   and $\tilde{A}$ = {(a,0)(b,0.8)(c,0.6)(d,1)}
   $\tilde{B}$ = {(1,0.2)(2,1)(3,0.8)(4,0)}
   $\tilde{C}$ = {(1,0)(2,0.4)(3,1)(4,0.8)}
   Determine the implication relations

   IF x is $\tilde{A}$ THEN y is $\tilde{B}$ .
   IF x is $\tilde{A}$ THEN y is $\tilde{B}$ ELSE y is $\tilde{C}$. [16]
8. Write note on the following.
   (a) Bidirectional Associate memories.
   (b) Grossberg layer. [8+8]

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Code No: 07A7EC01 **R07** **Set No. 4**

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1. Define defuzzification. Explain different methods of defuzzification. [16]
2. (a) Describe the geometry of fuzzy sets.
   (b) Describe the FAM system architectures. [8+8]
3. (a) Using MC-Culloch pitts model implement the following logic functions.
      i. Ex-OR gate.
      ii. Ex-NOR gate.
      iii. AND gate.
      iv. NAND gate.
   (b) Explain the organization of the brain in detail. [16]
4. (a) Define "sensor" connected with fuzzy control system.
   (b) Explain in detail any one application of neuro fuzzy techniques in power systems. [8+8]
5. Explain how a simple vowel-speech recognition system is implemented using back propagation algorithm. [16]
6. (a) Using suitable diagrams and equations explain the basic Bidirectional Associative
   (b) With suitable diagrams explain the competitive network. [8+8]
7. Class prototype vectors are
   $X_1 = [-2]$, $X_2 = \left[-\frac{2}{3}\right]$, $X_3 = [3]$ : Class 1
   $X_4 = [1]$, $X_5 = [2]$, : Class 2
   (a) Design the dichotomizer using a single discrete perceptron and non-linear discriminant function of quadratic type.
   (b) Draw separating lines in the augmented weight space for each pattern.
   (c) Draw patterns in augmented pattern space. [16]
8. Using the perceptron learning rule, find the weights required to perform the following classifications. Vectors (1 1 1 1),(-1 1 -1 -1) and (1 -1 -1 1) are members of class (having value -1). Use learning rate of 1 and starting weights of 0. Using each of the training and vectors as input , test the response of the net. [16]

Code No: 07A7EC01 **R07** **Set No. 4**

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Code No: 07A7EC01 **R07** **Set No. 1**

**IV B.Tech I Semester Examinations,MAY 2011**
**NEURAL NETWORKS AND FUZZY LOGIC**
**Common to Aeronautical Engineering, Instrumentation And Control Engineering, Electrical And Electronics Engineering**

**Time: 3 hours** **Max Marks: 80**

**Answer any FIVE Questions**
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1. (a) How is the error back propagated in BPN ?
   (b) Differentiate between local minima and global minima ? [8+8]

2. (a) Prove the fuzzy DeMorgan law.
      i. $A \cap A^C = (A^C \cup B^C)^C$
      ii. $A \cup A^C = (A^C \cap B^C)^C$
   (b) Given an example for the membership function of the fuzzy relation :="considerably smaller than" in RXR. Restrict $\tilde{R}$ to the first ten natural numbers and define the resulting matrix. [8+8]

3. Form a perceptron net for OR function with binary input and output. Compare it with the results using bipolar input and target. [16]

4. Draw a single layer network with continuous perceptions and present the delta learning rule. [16]

5. (a) Explain the following:
      i. Generalized Modus Ponens (GMP).
      ii. Generalized Modus Tollens (GMT).
   (b) Let H = High, VH = very high, $\tilde{S}$ = slow and $\tilde{Q}$ (Quite slow) indicate, the associated fuzzy sets as follows.
   For X={30,40,50,60,70,80,90,100}, the set of temperatures and Y={10,20,30,40,50,60}, the set of rotations per minute.
   $\tilde{H}$ = {(70, 1) (80, 1) (90, 0.3) }
   $\tilde{V}$ H = {(90, 0.9) (100, 1)}
   $\tilde{Q}$ S = {(10, 1) (20, 0.8)}
   $\tilde{S}$ = {(30, 0.8) (40, 1) (50, 0.6)}
   Apply the fuzzy Modus ponens rule to deduce Rotation is quite slow given.
      i. If the temperature is high then rotation is slow.
      ii. The temperature is very high. [16]

6. (a) Draw the Block diagram representation of associative memories and explain why they are needed.
   (b) Prove that in successive iterations, the energy either decreases or remain same but never increases in a discrete Hopfield model. [8+8]

7. (a) "Multi-layer network with linear activation function has same experience power as that of single layer network" elaborate and justify the statement.

   (b) What is the advantage of having hidden layers in an ANN? On what basis is the number of hidden layers and the number of neurons in each hidden layer selected?

[8+8]

8. Explain how neurocomputing circuits can be modeled using digital and analog circuits. [16]

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Code No: 07A7EC01 **R07** **Set No. 3**

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**Answer any FIVE Questions**
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1. State and explain the generalized delta learning rule applied in back propagation algorithm. [16]

2. Write short notes on the following:
   (a) Knowledge base in fuzzy logic control system.
   (b) Decision making logic in fuzzy logic control system. [8+8]

3. (a) With neat diagrams discuss the two self-organized feature maps.
   (b) Explain about learning vector quantization. [8+8]

4. Consider the fuzzy sets & defined on the interval X=[0,5] of real numbers,by the membership grade functions.
   $\mu(x) = \frac{X}{X+1}$ , $\mu\ \tilde{B}\ (x) = 2^{-x}$
   Determine the mathematical formulae and graphs of the membership grade functions of each of the following sets.
   (a) $A^c$,$B^c$.
   (b) A ∩ B.
   (c) A ∪ B .
   (d) $(A \cup B)^c$. [16]

5. (a) What are the rules based format used to represent the fuzzy information.
   (b) Explain the importance of fuzzi logic control in various fields. [8+8]

6. With an example explain how a pattern can be trained and classified using discrete perceptron algorithm. [16]

7. (a) How do you justify that brain is a parallel distributed processing system?
   (b) Explain the following terms with respect to Neural networks.
      i. Stability.
      ii. Plasticity.
      iii. Learning.
      iv. Architecture. [8+8]

8. (a) What are the stopping conditions used to stop the progress of the training algorithm.

(b) Explain the algorithm used for training the perceptron net. [8+8]

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