Code No: 07A7EC37 **R07** **Set No. 2**

IV B.Tech I Semester Examinations,November 2010
ARTIFICIAL NEURAL NETWORKS
Common to Bio-Medical Engineering, Electronics And Instrumentation Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Write history of artificial neural system development.
   (b) List and explain the various activation functions. Also explain their suitability with respect to applications. [8+8]
2. (a) Describe McCulloch-Pitts (MP) neuron model and explain the assumptions. involved in this theory. Also design a network using MP neuron to realize the NAND gate.
   (b) With suitable diagrams explain the competitive network. [8+8]
3. What is the backpropagation? Derive its weight update algorithm with a schematic two-layer feed forward neural network. Also explain its learning difficulties and improvements. [16]
4. (a) Explain the architecture of self-organizing map network.
   (b) Explain the training algorithm of Kohonen's layer training algorithm [8+8]
5. (a) Explain applications of feedforward and feedback (recurrent) neural networks.
   (b) Discuss how a control problem can be implemented using a neural network. [8+8]
6. (a) Explain the concept of "Energy function" in Hopfield networks.
   (b) Construct an energy function for a discrete Hopfield neural network of size N neurons. [8+8]
7. Consider a Kohonen net with two cluster units and five input units. The weight vector for the cluster units are:
   W_1= (0.1 0.3 0.5 0.7 0.9) and
   W_2= (0.9 0.7 0.5 0.3 0.1)
   Using Euclidian distance find the winning cluster unit for the input pattern. [16]
8. (a) Explain Boltzmann learning and mention its applications.
   (b) State and explain BAM energy theorem. [8+8]

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ARTIFICIAL NEURAL NETWORKS
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
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1. (a) Explain with a typical neural network architecture, how the stability of a neural network can be analyzed.
   (b) Discuss how neural networks are used in weather forecasting. [8+8]
2. (a) Give the brief operation of biological neural network.
   (b) Explain how biological neural network is superior over a conventional computer system. [8+8]
3. What is backpropagation? Derive its learning algorithm with a schematic two-layer feed forward neural network. [16]
4. (a) Distinguish between continuous Hopfield network and discrete Hopfield network.
   (b) Explain assumptions to be satisfied for the Hopfield network from the stability point of view. [8+8]
5. (a) Explain with example stability condition of BAM.
   (b) Explain in detail Boltzmann training algorithm. [8+8]
6. (a) Explain the working principle and training algorithm of Kohonen's self-organizing map.
   (b) Write short note on Grossberg layer. [10+6]
7. (a) Explain the Outstar learning principle and its mathematical modeling.
   (b) Given are a set of input training vectors and initial weight vector. The learning constant is assumed to be 0.1. The desired responses for X_1, X_2 and X_3 are d_1=-1, d_2=-1 and d3=1 respectively for a bipolar binary case. X_1 =[1, 2 ,0, 1]^T, X_2 = [0, 1.5, -0.5, -1.0]^T and X_3 = [-1, 1, 0.5, -1]^T . W^0 = [1,-1,0, 0.5]^T . With delat learning rule evaluate weight vector after completion of one cycle of training. [8+8]
8. (a) Explain Learning Vector Qunatizer (LVQ).
   (b) Compare Kohonen SOM and LVQ. [8+8]

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Code No: 07A7EC37 **R07** **Set No. 1**

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

Answer any FIVE Questions
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1. (a) Explain the differences between conventional computation and neural network computation.
   (b) Explain the structure of the brain and its organization. [8+8]
2. What is implied by learning in neural networks?. Describe various types of learning strategies employed and distinguish between them. [16]
3. (a) Give the architecture and explain the algorithm of Back propagation network.
   (b) Explain the modifications and limitations of Back propagation algorithm.[8+8]
4. Draw the Boltzmann machine architecture and explain its operation.What is the basis for Boltzmann learninig law? [16]
5. (a) Explain "Global stability of feedback neural network".
   (b) Discuss physical significance of energy function used in Hopfield neural network. [8+8]
6. (a) Explain the architecture and training method of self-organizing map network.
   (b) Explain the Grossberg layer training algorithm. [8+8]
7. Discuss how ART network can be used for
   (a) image processing
   (b) Chavadis recognition. [8+8]
8. Construct and test Learning Vector Quantization (LVQ) with four vectors assigned to two classes. Assume alpha=0.1. Perform interaction up to alpha = 0.05: [16]

VECTOR	CLASS
(1 0 1 0)	1
(0 0 1 1)	2
(1 1 0 0)	1
(1 0 0 1)	2

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Code No: 07A7EC37 **R07** **Set No. 3**

IV B.Tech I Semester Examinations,November 2010
ARTIFICIAL NEURAL NETWORKS
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Explain the methods of determining the winner-takes-all. Explain with an example. [16]

2. Discuss the following phases of ART network:
   (a) The recognition phase
   (b) The comparison phase. [8+8]

3. (a) Explain the architecture and training of counter propagation networks.
   (b) Describe the data structures for Adaline and Madaline simulators. [8+8]

4. Give the statement of optimization problem with equality constraints and explain how it can be solved using Hopfield neural network. [16]

5. (a) What are the assumptions to be satisfied for a network to form a Hopfield network?
   (b) Construct an energy function for the same size with N neurons. Show that the energy function decreases every time as the neuron output changes. [8+8]

6. With suitable diagram, derive the weight update equations in backpropagation algorithm for a multilayer feed forward neural network and explain the effect of learning rate, and momentum terms or weight update equations. [8+8]

7. (a) Explain the concept of Hebbian learning principle and its mathematical modeling.
   (b) Given are a set of input training vectors and initial weight vector. The learning constant is assumed to be 0.1. The desired responses for X_1, X_2 and X_3 are d_1=-1, d_2=-1 and d_3=1 respectively for a bipolar binary case. X_1 =[1, 2 ,0, 1]^T, X_2 = [0, 1.5, -0.5, -1.0]^T and X_3 = [-1, 1, 0.5, -1]^T . W^0 = [1,-1,0, 0.5]^T . With Widrow-Hoff learning rule evaluate weight vector after completion of one cycle of training. [8+8]

8. Compare the conventional and neural network computation with regards to the following tasks or performance aspects:
   (i) Problem solving
   (ii) Knowledge acquisition
   (iii) Knowledge retrieval.
   (iv) Internal data. [16]

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