Roll No. .....

24489

B.Tech. 7th Semester

(Computer Science Engineering)

Examination – December, 2012

NEURAL NETWORKS

Paper : CSE-407-F

Time : Three Hours] *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complain in this regard, will be entertained after examination.

Note : Question No. 1 is compulsory. Attempt five questions in total selecting one question from each section.

1. (a) Applications of ANN. 5 × 4

(b) Role learning factors.

(c) Linear associator

(d) Clustering.

(e) Memory based learning.

SECTION – A

2. (a) Compare and contrast biological neurons with ANN 10

(b) Describe Hebbian learning rule. 10

3. (a) Use Mc Culloch-Pitts neuron to design logic networks of AND & OR logic function. 8

(b) Make an arbitrary feed forward n/w with 3 neurons in i/p layer, 2 in hidden and 2 in o/p layer. Explain the concept of input vector, output vector, connection matrix, signal (or activation function) 12

SECTION – B

4. (a) Explain the single layer continuous perceptron training algorithm for linearly separable classification. 10

(b) Implement the single discrete perceptron training algorithm for c = 1 that provide the following classification to four patterns. 5

$X1 = [1\ 1], x3 = [3\ \ 1], d1 = d3 = 1$: Class 1

$X2 = [0.5\ 1], \times 4 = [-2\ 1], d2 = d4 = -1$: Class 2 10

Perform the training task starting with initial weight vector $w = [-2.5 \quad 1.75]^t$

5. (a) Explain error back propagation training algorithm. 10

(b) In which manner multilayer perceptron models differ from single layer perceptron model. Explain the reasons for emergence of multilayer perceptron model. 10

SECTION – C

6. The weight matrix W for a n/w with bipolar discrete binary neurons is given as. 20

0	1	–1	–1	–3
1	0	1	1	1
–1	1	0	3	1
–1	1	3	0	1
3	–1	1	1	0

Assume threshold and external i/p of neurons are zero. Compare the values of energy for v = [-11111]^t and v= [-1-1 1-1-1]^t

7. Differentiate between auto association and heteroassociation, the linear associator has to associate the following pair of vectors : 20

$$s^{(1)} = \left[\tfrac{1}{2} \quad \tfrac{1}{2} \quad \tfrac{1}{2} \quad \tfrac{1}{2}\right]^t \rightarrow f^{(1)} = [0\,1\,0]^t$$

$s^{(2)} = [1/2 \; -5/6 \; 1/6 \; 1/6]^t \rightarrow f^{(2)} = [1\,0\,1]^t$

$s^{(3)} = [1/2 \; -1/6 \; 1/6 \; -5/6]^t \rightarrow f^{(3)} = (0\,0\,0)^t$

(i) Verify that vectors $s^{(1)}$, $s^{(2)}$, $s^{(3)}$ are orthonormal

(ii) Create partial weight matrics for each desired association.

(iii) Compute the total weight matrix.

SECTION – D

8. Explain in detail unsupervised learning of clusters. 20

9. Perform the first learning cycle using the following normalized pattern set : 20

$\{\times 1, \times 2, \times 3, \times 4\} = \{1 < 45°, 1 < 135°, 1 < 90°, 1 < 180°\}$

$\&\alpha = 0.5$

Using the winner like all training rule for two cluster neurons. Draw the resulting separating hyperplanes. Initial weights are to be assumed $w1° = [10]^t$ and $w2° = [0 - 1]^t$.