

IV B.Tech. II Semester Supplementary Examinations, July -2005
NEURAL NETWORKS
(Electronics & Computer Engineering)

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

Answer any FIVE Questions
All Questions carry equal marks

1. What is meant by an activation function in an artificial neuron model. Describe the various activation functions that are employed and compare their merits and demerits.
2. Briefly discuss about linear separability and the solution for EX-OR problem. Also suggest a network that can solve EX-OR problem.
3. Implement a back propagation network to simulate the following EX-OR function.

i/p1	i/p2	o/p
1	1	0
1	0	1
0	1	1
0	0	0

Try the architecture in which there is only a single hidden unit and all units are connected with each other. If the network uses very steep sigmoid function, can you find a set of weights right away without running the learning algorithm?

4. Explain the working of a Hopfield network, with a neat sketch of its architecture.
5. Explain the Kohonen's method of unsupervised learning. Discuss any example as its application.
6. Derive expressions for the weight updation involved in counter propagation.
7. (a) What are the advantages of ART network. Discuss about gain control in ART network.
(b) Discuss in detail about orienting subsystem in an ART network.
8. Describe how a neural network may be trained for a pattern recognition task. Illustrate with an example

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1. Describe briefly some important applications of Artificial Neural Networks highlighting the type of neural network that is used in each case.
2. (a) Write the advantages and disadvantages of perceptron.
(b) Explain Least Mean Square (LMS) algorithm.
3. Explain the backpropagation algorithm and derive the expressions for weight update relations?
4. Describe the Hopfield model. In this model why is the energy of the all zero state always '0' in any net of any size? Use this fact to argue that at least one threshold must be negative for the all-zero state not to be stabilize well.
5. Explain the working of Kohonen's self-organizing map and derive weight update relations.
6. Derive expressions for the weight updation involved in counter propagation.
7. What is the function of ART network and explain its operation with relevant equations.
8. What are the applications of Kohonens networks in image processing and pattern recognition?

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1. (a) Consider a multilayer feed forward network, all the neurons of which operate in their linear regions. Justify the statement that such a network is equivalent to a single layer feed forward network.
(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?
2. 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.
3. Explain the backpropagation algorithm and derive the expressions for weight update relations?
4. The truncated energy function, $E(v)$, of a certain two-neuron network is specified as

$$E(v) = -\frac{1}{2}(v_1^2 + 2v_1v_2 + 4v_2^2 + v_1) \text{ , Assuming high-gain neurons,}$$

- (a) find the weight matrix W and the bias current vector i .
- (b) Determine whether single-layer feedback neural network postulates (symmetry and lack of self-feedback) are fulfilled for W and i computed in part (a).
5. Explain the architecture and training of Kohonen's self-organizing network.
6. Derive expressions for the weight updation involved in counter propagation.
7. (a) What are the advantages of ART network. Discuss about gain control in ART network.
(b) Discuss in detail about orienting subsystem in an ART network.
8. Describe how a neural network may be trained for a pattern recognition task. Illustrate with an example

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1. What is meant by an activation function in an artificial neuron model. Describe the various activation functions that are employed and compare their merits and demerits.
2. 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.
3. (a) How pattern mode and batch mode of training affect the result of backpropagation learning?
(b) What is the significance of momentum term in backpropagation learning?
(c) Briefly explain the refinements of the backpropagation learning and also the interpretation of the result of the learning.
4. What are the modes of operation of a Hopfield network? Explain the algorithm for storage of information in a Hopfield network. Similarly explain the recall algorithm.
5. Discuss how the “Winner-Take-All” in the Kohonen’s layer is implemented and explain the architecture, Also explain the training algorithm.
6. Using suitable diagrams and equations explain the basic Bidirectional Associative Memory configuration. Also describe its energy function.
7. Explain the major phases involved in the ART classification process.
8. Describe how a neural network may be trained for a pattern recognition task. Illustrate with an example
