

III B.Tech II Semester Supplementary Examinations, Aug/Sep 2008
NEURAL NETWORKS
(Computer Science & Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. Draw and Explain in detail the block diagram of nervous system. [16]
2. Explain concept of associate memory model using artificial neurons. With relevant Diagram. [16]
3. Explain the following:
 - (a) Gradient vector
 - (b) Hessian matrix. [8+8]
4. The optimum number of hidden layers in back propagation is two. justify? What happens if number of hidden layers increases? Explain. [16]
5.
 - (a) What are the steps involved in the back propagation algorithm. Explain
 - (b) What are the pattern recognition tasks that can perform by back propagation network. Explain Briefly
 - (c) What are the limitations of back propagation algorithm? [8+4+4]
6.
 - (a) Write about Kohonen model of self organized feature map.
 - (b) Write short notes on learning vector quantization. [8+8]
7.
 - (a) Discuss about stability and convergence in the context of an autonomous non-linear dynamical system with equilibrium state.
 - (b) Draw and explain block diagram of related model. [8+8]
8. What is gradient type Hopfield network? Differentiate between discrete time Hopfield network and gradient type Hopfield network. [16]

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1. Write the various benefits of neural networks. Explain them in detail. [16]
2. (a) Explain the learning rule which is based on statistical mechanics.
(b) Explain the learning rule which is operates on concept of “memorilng data”. [8+8]
3. Explain the following briefly
 - (a) Linear least square filter
 - (b) Least-mean-square algorithm. [8+8]
4. (a) Explain how multilayer perceptron is used for pattern recognition.
(b) How parrern recognetion is useful in Image Processing. [16]
5. Explain in detail Hessian based Network pruning. [16]
6. (a) Write about Kohenen model of self organized feature map.
(b) Write short notes on learning vector quantization. [8+8]
7. Restate Lyapunov’s theorems for the state vector $x(0)$ as the equilibrium state of a dynamical system. [16]
8. (a) What is the Hopfield network? Explain.
(b) Describe how Hopfield network can be used to have analog to digital conver- sion. [4+12]

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1. (a) Write about non-linear model of a Neuron.
(b) Explain the stochastic model of Neuron [8+8]
2. (a) Explain Hebbian Learning in detail.
(b) Explain about adaption in detail. [8+8]
3. (a) Write about Bayes classifier for Gaussian distribution
(b) What is the relation between perceptron Bayes classification explain. [8+8]
4. "Hidden neurons play a critical role in the operation of a multilayer perceptron with back propagation learning". Explain? [16]
5. Briefly explains the following:
(a) Applications of Back propagation Network
(b) Limitations of Back propagation network
(c) Extensions of Back propagation. [8+4+4]
6. Determine the Self organization map generated by points selected at random from an annular ring formed by two concentric circles, consider the following two cases.
(a) The units in the Self organization map are arranged in a 2-dimensional plane.
(b) The units in the self organization map are arranged in 1-dimensional layer. [8+8]
7. Explain stability of equilibrium states of an autonomous dynamical system. [16]
8. (a) Explain the working of a Hopfield network with a neat sketch of its architecture
(b) Taking a three-node net, determine the weight matrix to store the following states $V_1 V_2 V_3 = 000, 011, 110$ and 101 using Hebb's rule. [8+8]

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1. (a) Explain how to build invariances into neural network design.
(b) Explain how to build prior information into neural network design. [8+8]
2. (a) Write in detail about error-detection learning.
(b) Write in detail about memory brief learning. [8+8]
3. Explain the following briefly:
 - (a) Steepest descent method
 - (b) Newton's method
 - (c) Gauss-Newton's method
 - (d) Convergence of LMS algorithm. [4+4+4+4]
4. Explain in detail about the following methods which are useful in improving back propagation algorithm.
 - (a) Maximizing information content
 - (b) Activation function. [8+8]
5. (a) Write and explain the Back propagation algorithm.
(b) Write about applications of Back propagation network. [8+8]
6. What are the self organizing maps? Explain the architecture and the training algorithm used for Kohonen's SOMs. [16]
7. Explain the mathematical model for describing the dynamics of a nonlinear system. [16]
8. (a) What is the relationship between the number of neurons and number of system states in a typical Hopfield network.
(b) Write down the steps involved in the retrieval phase of operation of a hopfiled network and explain each step in detail. [6+10]
