2006 JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY

IV B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS
NEURAL NETWORKS & FUZZY LOGIC CONTROL
(MECHATRONICS)

Apr/May 2006

TIME – 3 HOUR
MARK – 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Give the brief operation of biological neural network.

(b) Explain how biological neural network is superior over a conventional computer system. [8+8]

2. (a) With help of suitable diagram, discuss the dynamics of the Hopfield network.

(b) Taking a three-node net, why cannot the following states $V_1 V_2 V_3 = 000, 011, 110$ and 101 be made stable. [6+10]

3. What are the self organizing maps?. Explain the architecture and the training algorithm used for Kohonens SOMs. [16]

4. Explain the procedure for identification of dynamical system using neural networks. [16]

5. Let $X = \{1, 2, 3, \ldots , 10\}$. Determine the cardinalities and relative cardinalities of the following fuzzy sets.

(a) $\tilde{A} = \{(3, 10), (4, 0.2), (5, 0.3), (6, 0.4), (7, 0.6), (8, 0.8), (10, 1), (12, 0.8), (14, 0.6)\}$
.
(b) $\tilde{B} = \{(2, 0.4), (3, 0.6), (4, 0.8), (5, 1.0), (6, 0.8), (7, 0.6), (8, 0.4)\}$

(c) $\tilde{C} = \{(2, 0.4), (4, 0.8), (5, 1.0), (7, 0.6)\}$ [4+4+8]

6. What are the main components of fuzzy logic controller? Explain each of them in detail. [16]

7. Explain the design procedure of a fuzzy logic controller. Illustrate it with an example. [16]

8. Show the first 2 iterations in trying to compute the membership functions of the following data using 3 layer feed forward network
X1 X2 X3 Y1 Y2 Y3
0.001 0.31 0.28 0 1 0

(a) Use $3 \times 4 \times 2$ network with initial random weights [8+8]

(b) Use binary step activation function for hidden layer and sigmoid activation function for o/p layer.