

IV B.Tech I Semester Supplementary Examinations, Apr/May 2006
NEURAL NETWORKS & FUZZY LOGIC CONTROL
(Mechatronics)

Time: 3 hours

Max Marks: 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 $X = \{1, 2, 3, \dots, 10\}$. 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) $\tilde{C} = \{(2, 0.4), (4, 0.8), (5, 1.0), (7, 0.6)\}$ [6+5+5]
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

| X_1 | X_2 | X_3 | Y_1 | Y_2 | Y_3 |
|-------|-------|-------|-------|-------|-------|
| 0.001 | 0.31 | 0.28 | 0 | 1 | 0 |

 (a) Use $3 \times 4 \times 2$ network with initial random weights
 (b) Use binary step activation function for hidden layer and sigmoid activation function for o/p layer. [8+8]
