**53 (IT 819) FLNN**

**2017**

# FUZZY LOGIC AND NEURAL NETWORKS

Paper : IT 819 (Back)

*Full Marks : 100*

Time : Three hours

***The figures in the margin indicate full marks for the questions.***

*Answer **any five** questions out of **seven**.*

1. *(a)* Compare fuzzy set and crisp set. 6

   *(b)* What is fuzzy complement ? What are the axioms to be satisfied so that a function can be used as fuzzy complement ? Check whether the function $x+y-x.y$ can be used as fuzzy union. 10

   *(c)* Explain *four* major steps in fuzzy rule based model. 4

2. *(a)* Explain membership function with an example. 8

(b) A linguistic variable $x$ which measures the academic excellence is taken from universe of discourse $U = \{1\ 2\ 3\ 4\ 5\ 6\ 7\ 8\ 9\ 10\}$. The membership functions are defined as follows :

$\mu$ (excellent) = $\{(8,0{\cdot}2)\ (9,0{\cdot}6)\ (10,1)\}$,

$\mu$ (good) = $\{(6,0{\cdot}1)\ (7,0{\cdot}5)\ (8,0{\cdot}9)\ (9,1)\ (10,1)\}$

Construct membership function of good but not excellent. 12

3. (a) Using Venn diagram sketch the relations among Neural networks, Genetic algorithms and Fuzzy logic. 6

(b) Explain what do you mean by ADALINE and MADALINE. 5

(c) Write notes on the following : 9

(i) Ambiguity

(ii) Fuzziness

(iii) In exactness.

4. (a) Distinguish between the feed forward and feedback neural networks. Compare their input-output mapping. 10

(b) What are the various building blocks of neural networks ? 10

5. (a) What is genetic algorithm ? Explain different steps of genetic algorithm with a flow chart. 10

(b) What is XOR problem ? Draw and explain the architectural graph of network for solving the XOR problem. 10

6. (a) What is the difference between Similarity and Possibility approaches for fuzzy databases ? What are the advantages and disadvantages of these approaches ? Give examples where you would tend to favour one approach over the other. 10

(b) What is learning rule ? Explain Hebbian learning and Competitive learning. 10

7. *(a)* A Hopfield network made up of 5 neurons, is required to store the following the fundamental memories :

$$E_1 = \{+1,+1,+1,+1,+1\}^T$$

$$E_2 = \{+1,-1,-1,+1,-1\}^T$$

$$E_3 = \{-1,+1,-1,+1,+1\}^T$$

Evaluate the 5 by 5 synaptic weight matrix of the network. 10

*(b)* Write short notes on the following : 10

*(i)* Fuzzification interface

*(ii)* Knowledge base in fuzzy logic controller.