

Elective - I : Fuzzy Logic and Neural Networks

P. Pages : 2

Time : Three Hours



NKT/KS/17/7462

Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Due credit will be given to neatness and adequate dimensions.
 9. Assume suitable data whenever necessary.
 10. Diagrams and chemical equations should be given whenever necessary.
 11. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Define the 'Crisp set' and 'Fuzzy Set' and distinguish between them. 7
b) Explain the standard operations performed on fuzzy set with example. 7

OR

2. a) Let 'z' be a fuzzy set defined by, 7
$$z = 0.3/x_1 + 0.8/x_2 + 0.1/x_3 + 0.5/x_4$$
$$+ 0.2/x_5 + 0/x_6 + 1/x_7 + 0.7/x_8.$$

List ' α -cuts' and 'strong α -cuts' of 'z' for values of $\alpha_1 = 0.1$ and $\alpha_2 = 0.6$ among the close interval $\alpha \in [0,1]$.

- b) Explain t-norms and t-conorms. 7
3. a) With the help of block diagram. Explain structure of fuzzy knowledge based controller. 7
b) Explain the center of Gravity (COG). Defuzzification method. 6

OR

4. a) What are the types of FKBC, Explain any one in detail. 7
b) Enlist and explain any one application of FLC from industrial perspective. 6
5. a) Explain Binary fuzzy relations. 7
b) Distinguish between linear and Non-linear system on the basis of superposition principles. 6

OR

6. a) Determine which fuzzy sets defined by the following functions are fuzzy numbers. 7
- i) $A(x) = \sin(x)$; for $0 \leq x \leq \pi$
 $= 0$; otherwise
- ii) $B(x) = \min(1, x)$; for $x \geq 0$
 $= 0$; for $x < 0$.

b) Explain in short the defuzzification Mean of Maxima (MoM) method. 6

7. a) Explain with suitable flowchart the steps involved in training neural network. 7
- b) State and explain the perception convergence theorem. 7

OR

8. a) Explain with suitable neat diagram the "ADALINE" perception training algorithm. 7

b) Explain the Bi-directional Associative Memory (BAM) in the context of Auto-association in first layer followed by weight matrix mapping into second layer. 7

9. a) What do you mean by Feed-forward Neural network? Explain the difference between synchronous and Asynchronous N.N. 7

b) Write a short note on Recurrent network. 6

OR

10. a) Explain Hamming network to calculate hamming distance between stored vectors and input vectors. 7

b) Write a short note on – "self-organizing feature maps". 6

11. a) What do you understand by layered neural network? Explain in short the following with suitable schematic illustration. 7

- i) Acyclic N.N. ii) Cyclic N.N.
 iii) Feed forward N.N. iv) Modular N.N.

b) Explain Adaptive Resonance theory (ART-1) in detail. 6

OR

12. a) What do you mean by computing functions associated with numerical processing unit (node) of any N.N. Explain the following computing functions. 7

- i) Unit step function. ii) Signum function.
 iii) Sigmoid function.

b) Explain in brief any three neural network learning rules. 6
