(3 Hours)   [Total Marks :80

Instructions to the candidates, if any

N.B. 1) Question No. 1 is compulsory.

     2) Solve any three questions out of remaining five questions.

     3) Draw neat labeled diagram wherever necessary.

     4) Answers to each new question to be started on a fresh page.

Q1: Solve any four: (5x4=20)

a) Draw and explain neural networks based OR function.

b) Draw and explain McCulloch Pitts neuron architecture.

c) What do you mean iterations and epochs with reference to training of neural network

d) For the two fuzzy sets:

Consider two fuzzy sets given by:

$$A = \left\{ \frac{1}{2} + \frac{0.2}{3} + \frac{0.5}{4} \right\}$$

$$B = \left\{ \frac{0.9}{2} + \frac{0.4}{3} + \frac{0.8}{4} \right\}$$

Find i) A U B ii) A ∩ B iii) $\bar{A}$ iv) $\overline{A \cup B}$ of the fuzzy sets

e) Explain with block diagram the unsupervised neural networks with an example

Q.2 A) Describe delta learning rule with flow chart.   (10)

Q.2 B) Draw Hopfield Neural Network with four output nodes. Also explain training and testing algorithm of Hopfield neural network.   (10)

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Q.3A)i) A Hopfield network made up of five neurons, which is required to store the following patterns:

$P1 = [1 \ 1 \ 1 \ 1 \ 1]^T$

$P2 = [1 \ -1 \ -1 \ 1 \ -1]^T$

$P3 = [-1 \ 1 \ -1 \ 1 \ 1]^T$

Evaluate the 5-by 5 weight matrix of the Hopfield Network (6)

ii) Explain any four properties of fuzzy sets (4)

Q.3B) Explain the following: (10)

    i) Radial Basis Function Neural Network structure for Classification

    ii) Fuzzy Inference System with block diagram

Q.4A) Explain perceptron learning algorithm and develop perceptron network to implement two inputs OR gate to function. Consider inputs and output as bipolar. Assume initial weight and bias values equal to zero. Consider learning rate equal to one. (10)

Q.4B) Explain any four methods for defuzzification in details. (10)

Q.5. A) Describe the application of Neural Network for face recognition. (10)

Q.5. B) Explain how Fuzzy logic can be used in image smoothing. (10)

Q.6. A) What do you mean by membership function? Explain with diagram. Describe any three fuzzy membership functions with diagram and mathematical equations. (10)

Q.6. B) Describe the following with suitable diagram: (10)

i) Hand written character recognition using Neural Networks.

ii) Application of Fuzzy logic for image contrast enhancement.