

Q.P. Code: 26682

Duration 3 Hours

Maximum marks 80

- 1) Question 1 is compulsory.
- 2) Solve any three from the remaining five questions.
- 3) Assume suitable data if necessary.
- 4) Figures to the right indicate full marks.

- Q.1. Attempt any **four** from the following questions. 20
- a Differentiate between feed forward and recurrent artificial neural networks.
 - b What is the importance of bias in an artificial neural network?
 - c Explain the delta rule of learning with an example.
 - d Explain Max-membership principle of defuzzification..
 - e State any four learning rules.
- Q.2.a Discuss the learning factors involved in back propagation network. 10
- b Apply Perceptron learning rule to a network presented with the following training vectors: 10
 $X_1 = [1 \ -2 \ 0 \ -1]^t$; $X_2 = [0 \ 1.5 \ -0.5 \ -1]^t$; $X_3 = [-1 \ 1 \ 0.5 \ -1]^t$
 The learning constant, $c=0.1$ and the desired responses for X_1 , X_2 and X_3 are $d_1 = -1$, $d_2 = -1$ and $d_3 = 1$ respectively. Assume the initial weight vector to be $W_1 = [1 \ -1 \ 0 \ 0.5]^t$ and obtain the updated weight vector after one epoch.
- Q.3.a Construct an autoassociative network to store the vectors $X_1 = [1 \ 1 \ 1 \ 1 \ 1]$, $X_2 = [1 \ -1 \ -1 \ 1 \ -1]$, $X_3 = [-1 \ 1 \ -1 \ -1 \ -1]$. Find the weight matrix with no self connection and calculate the energy of the stored patterns. Using discrete Hopfield network test the pattern $S = [1 \ 1 \ 1 \ -1 \ 1]$. 10
- b Explain in detail Adaptive Resonance Theory networks. 10
- Q.4.a With a neat architecture, explain the training algorithm of Kohonen self-organizing feature maps. 10
- b With a neat architecture, explain the training algorithm of Adaline network. 10
- Q.5.a Two fuzzy sets are defined as: 10
- $$\tilde{A} = \left\{ \frac{0.4}{1} + \frac{0.5}{2} + \frac{0.45}{3} + \frac{0.6}{4} + \frac{0.8}{5} \right\}$$
- $$\tilde{B} = \left\{ \frac{0.5}{1} + \frac{0.5}{2} + \frac{0.2}{3} + \frac{0.5}{4} + \frac{0.75}{5} \right\}$$
- Perform union, intersection, difference and complement over these fuzzy sets.
- b With the help of a block diagram, explain the working of a fuzzy logic controller. 10

- Q.6 Write short notes on any **four**:
- a) McCulloch-Pitts Neuron
 - b) Perceptron convergence theorem
 - c) Simulated annealing neural network
 - d) Radial Basis Function Networks
 - e) Bidirectional Associative Memory

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