

[Total No. of Questions - 9] [Total No. of Printed Pages - 3]
(2125)

15254

B. Tech 7th Semester Examination
Neural Networks and Fuzzy Logic (OS)
EE-7004

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five question in all, selecting one from each section A, B, C and D. Section E is compulsory.

SECTION - A

1. Draw the structure of a biological neuron. List the main components of the biological neuron. Compare and contrast biological neuron and artificial neuron. (20)
2. (a) State the training algorithm used for the McCulloch-Pitts network with its architecture. (10)
(b) What is supervised learning and how is it different from unsupervised learning? (10)

SECTION - B

3. Construct an auto associative network to store the vectors $X_1 = [1 \ 1 \ 1 \ 1 \ 1]$, $X_2 = [1 \ -1 \ -1 \ 1 \ -1]$, and $X_3 = [-1 \ 1 \ -1 \ -1 \ -1]$. Find weight matrix with no self-connection. Calculate the energy of the stored patterns. Using discrete Hopfield network test patterns if the test pattern are given as $X_1 = [1 \ 1 \ 1 \ -1 \ 1]$, $X_2 = [1 \ -1 \ -1 \ -1 \ -1]$, and $X_3 = [1 \ 1 \ -1 \ -1 \ -1]$. Compare the test patterns energy with the stored patterns energy. (20)

2

15254

4. (a) Draw the architecture of back-propagation algorithm. List the stages involved in training of back propagation network. (10)
(b) Sketch the architecture of full counter propagation network. Write the training algorithms and testing algorithm used in full counter propagation network. (10)

SECTION - C

5. (a) Define classical set. Differentiate fuzzy set from classical set and name the properties of classical sets. (10)
(b) State the importance of fuzzy arithmetic. (10)
6. (a) Explain the different types of membership function used in Fuzzification process. (10)
(b) Perform the following operations on intervals:
(i) $[5, 3] + [4, 2]$ (ii) $[1, 2] \times [5, 3]$
(iii) $[7, 3] \div [3, 6]$ (iv) $[6, 9] - [2, 4]$. (10)

SECTION - D

7. (a) Define defuzzification. Explain the various methods of defuzzification in detail. (10)
(b) Write short notes on introduction to Neuro-fuzzy controllers. (10)
8. With a neat block diagram, explain the architecture of a fuzzy logic controller. What are the steps involved in designing a fuzzy logic controller? List the various applications of fuzzy logic controller. (20)

[P.T.O.]

SECTION - E

9. (a) Define an artificial neural network.
- (b) What are the classifications of activation function?
- (c) What are the applications of neural networks?
- (d) Define perception learning rule.
- (e) Mention the applications of Hopfield network.
- (f) What are the applications of back propagation algorithm?
- (g) List the properties of fuzzy sets.
- (h) Define boundaries of a membership function.
- (i) List the features of fuzzy control system.
- (j) What is the necessity of defuzzification process?
- (10x2=20)