2023
B.E. (Electronics and Communication Engineering)
Eighth Semester
EC-810: Neural Networks and Fuzzy Logic

Time allowed: 3 Hours

Max. Marks: 50

NOTE: *Attempt five questions in all, including Question No.* **1** *(Section-A) which is compulsory and selecting two questions each from Section B-C.*

x-x-x

SECTION-A

1. Answer in brief and to the point:
    a) Explain the concept of learning in ANN
    b) What are Fuzzy Inference Systems? Compare its different types.
    c) What are neuro fuzzy systems? List any two defuzzification methods and explain any one in detail.
    d) List the merits and limitations of back-propagation training method.
    e) Given a Fuzzy set A= {(1, .2), (2, .4), (3, .6), (4, .8), (5, 1)}. Find the cardinality of A and A^c.

    5x2=10

SECTION-B

2. (a) Define and discuss the various activation functions used in neural networks. (5)

    (b) Discuss one practical application of ANN. Then explain how the AAN is able to provide better solution as compare with conventional method. (5)

3. What is linear separability? How boundary region is determined using linear separability? Demonstrate it by realizing AND gate for bipolar inputs and targets. Also discuss why bipolar data is preferred over unipolar data.

    (10)

4. Write technical note on the followings:
    (a) Hopfield network:- Design and limitations
    (b) Universal function approximation. (10)

SECTION-C

5. (a) Describe ART network, its architecture and algorithms. Also contrast ART1 and ART2 networks. (5)

    (b) Consider two fuzzy sets A and B defined in the universe $\{1, 2, 3, 4, 5\}$ are given by:

    $$A = \left\{\frac{1}{2} + \frac{0.5}{3} + \frac{0.3}{4} + \frac{0.2}{5}\right\} \text{ and } B = \left\{\frac{0.5}{2} + \frac{0.7}{3} + \frac{0.2}{4} + \frac{0.4}{5}\right\}$$

    Perform different logical operation giving their physical significance. (5)

6. Write technical note on the followings:
    a) Variable Inference Techniques
    b) Vector Quantization (10)

7. (a) What is a fuzzy set? How it can model the ambiguities from the real world. (3)

    (b) Define 'core' and 'support' of a membership function. (2)

    (c) Discuss the use of competitive learning in designing of Maxican hat network. (5)

x-x-x