ANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal)

MANIPAL

SEVENTH SEMESTER B.TECH. (INSTRUMENTATION AND CONTROL ENGG.) END SEMESTER DEGREE EXAMINATIONS, JANUARY - 2021

Neural Networks and Fuzzy Logic (ICE 4014)

TIME: 3 HOURS

MAX. MARKS: 50

Instructions to candidates : Answer ALL questions and missing data may be suitably assumed.

29-01-2021

- 1A. Compare and contrast biological neuron with artificial neuron starting from the structure to function with the schematic of both.
- 1B. Find the new weights using BPN network shown in Fig Q1B. The network is presented with the input pattern [-1, 1] and the target output is +1. Use a learning rate of α =0.25 and bipolar sigmoidal activation function.



Fig. Q1B

(4+6)

- i) Explain the training algorithm used in a network which consists of a single linear unit.ii) How is a Madaline network formed? Explain with the diagram.
- 2B What is the purpose of LVQ net? With architecture describe how LVQ nets are trained? List the variations of LVQ net.

(4+6))

3A What is clustering principle? Construct a Maxnet with four neurons and inhibitory weight $\varepsilon = 0.2$, given the initial activations as follows:

$$a_1(0) = 0.3, a_2(0) = 0.5, a_3(0) = 0.7, a_4(0) = 0.9$$

3B What are fuzzy tolerance and equivalence relation? Explain how a crisp tolerance and a fuzzy tolerance relation can be converted to crisp equivalence and fuzzy equivalence relation respectively? (4+6)

- 4A Explain the inference method adopted for assigning membership values.
- 4B What is defuzzification? List different defuzzification methods. Find the defuzzified value using centroid method for the figure shown in Fig.Q4B.



- 5A Write the block diagram of Fuzzy logic control system and design a fuzzy logic controller to simulate Aircraft landing problem.
- 5B Write short notes on i) Formation of rules and ii) Decomposition of Rules
- 5C Explain how a neural network can be used in Natural Language Processing.

(4+4+2)

(4+6)