Reg. No. | | | | | | | | | | |

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

SEVENTH SEMESTER B.TECH. (INSTRUMENTATION AND CONTROL ENGG.)

END SEMESTER DEGREE EXAMINATIONS, DECEMBER - 2019

SUBJECT: NEURAL NETWORK AND FUZZY LOGIC [ICE 4014]

TIME: 3 HOURS MAX. MARKS: 50

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

1A. Use delta rule to train ANDNOT function with bipolar inputs and targets. Perform 2 epochs of training.

1B. With a flow chart explain the different stages involved in training of Back propagation network algorithm

1C. Design a Hebb net to implement AND function with a) binary inputs and targets b) binary inputs and bipolar targets.

(3+3+4)

2A Implement AND function using MP neuron(take bipolar inputs)

2B Consider a Kohonen net with two cluster units and five input units. The weight vectors for the cluster units are

$$w_1 = (1.0, 0.9, 0.7, 0.3, 0.2)$$
$$w_2 = (0.6, 0.7, 0.5, 0.4, 1.0)$$

Use the square of Euclidean distance to find the distance to find the winning cluster unit for the input pattern x = (0, 0.2, 0.1, 0.2, 0). Using a learning rate of 0.2 find the new weights for the winning unit.

2C Consider an LVQ with five vectors assigned to classes

Vectors	Class
(1 0 0 1)	1
(0 1 0 0)	2
(1 1 1 1)	2
(1 1 0 0)	1
(0 1 1 0)	2

Assuming the first two vectors as the initial weights, calculate the new weights.

(2+3+5)

3A Define a) Weights b) Threshold c) Learning rate d) Momentum factor

3B Find the lambda cut relation for Lambda= 0.1, 0+, 0.3,0.6, 0.7, 1.0 for the fuzzy relation

$$R = \begin{bmatrix} 1 & 0 & 0.2 & 0.1 & 0.4 \\ 0.6 & 0.7 & 0.3 & 0.5 & 0 \\ 0.8 & 0.9 & 0.6 & 0.3 & 0.2 \\ 0.1 & 0 & 1 & 0.9 & 0.7 \end{bmatrix}$$

3C Define Membership function and explain the features of membership functions with necessary diagram

(3+4+3)

4A Explain the inference approach used for membership value assignment.

4B What is defuzzification? Explain four methods of defuzzification techniques.

4C Discuss in detail on Mamdani inference method with one example

(3+4+3)

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) Fuzzy propositions ii) Decomposition of Rules

5C Discuss in detail on one real world application of neural network

(4+3+3)

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