



MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

Reg. No.

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SECOND SEMESTER M.TECH. (CONTROL SYSTEMS)

END SEMESTER DEGREE EXAMINATION, JUNE - 2019

SUBJECT: SOFT COMPUTING TECHNIQUES [ICE 5222]

TIME: 3 HOURS

MAX. MARKS: 50

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

- 1A Define Fuzzy symmetry, transitivity and reflexivity property with necessary sketches.
1B Describe any three types of membership functions with necessary diagram and expressions.
1C Explain any five defuzzification method with suitable example. (2+3+5)
- 2A Write short notes on decomposition of rules.
2B With suitable block diagram explain the working of fuzzy inference system.
2C Design a fuzzy inference system to simulate temperature control of a room. (2+3+5)
- 3A Implement XOR function using McCulloch –Pitts neuron (consider binary data).
3B With a flow chart explain the different stages involved in MADALINE.
3C Implement AND function using perceptron networks for bipolar inputs and targets. (3+4+3)
- 4A Construct an auto associative network to store the vectors
 $x_1 = [1 \ 1 \ 1 \ 1 \ 1 \ -1]$, $x_2 = [-1 \ -1 \ -1 \ 1 \ 1 \ 1]$, $x_3 = [1 \ 1 \ 1 \ -1 \ -1 \ -1]$. Find weight matrix with no self-connection. Calculate the energy of the stored patterns.
4B Construct a Kohonen self-organizing map to cluster the four given vectors, $[0 \ 0 \ 1 \ 1]$, $[1 \ 0 \ 0 \ 0]$, $[0 \ 1 \ 1 \ 0]$ and $[0 \ 0 \ 0 \ 1]$. The number of clusters to be formed is two. Assume an initial learning rate of 0.5.
4C Explain the different steps involved in Learning vector Quantization (LVQ) with the flowchart. (3+3+4)
- 5A What is adaptive resonance theory network? Explain the basic architecture of ART1 network with the diagram
5B Discuss the applications of neural network in pattern recognition.
5C Describe the basic operators used in genetic algorithm with diagram. (5+3+2)
