Motilal Nehru National Institute of Technology Allahabad

Department of Computer Science & Engineering

MCA Third Semester, Ph.D Course Work

Mid Semester Examination

Subject Code/Name: CA3303/Soft Computing

Duration: **90 Minutes** MaximumMarks:**20**

Note: Be brief while answering the questions. Write your assumptions before answering any question with missing data (*if you find one*). **Good Luck.**

I Answer all Questions. 4 × 1 Marks

1. Give at least five applications of Soft Computing.
2. Design networks using M-P neurons for binary OR and AND logic gates.
3. Describe some attractive features of the biological neural network.
4. What is feature extraction? Answer in terms of Pattern Classification task.

II Answer all Questions. 4 × 4 Marks

1. (a) Briefly explain about Supervised and Unsupervised learning with examples. **(2 Marks)**

   (b) What is a training set and how is it used to train neural networks? **(2 Marks)**

2. (a) *Figure 1* shows a single artificial neuron. The node has three inputs x =(x1, x2, x3) that receive only binary signals (either 0 or 1). How many different input patterns this node can receive? What if the node had four inputs? Five? Can you give a formula that computes the number of binary input patterns for a given number of inputs? **(2 Marks)**

   (b) Explain classification and clustering. State the difference between these two. **(2 Marks)**

3. (a) Design networks using M-P neurons to realize the following logic functions using (+1 and -1) as the weights.**(2 Marks)**

$$s(a_1, a_2, a_3) = \bar{a}_1 a_2 \bar{a}_3$$

(b) Prove one of the De Morgan's Law using the properties of sets. **(2 Marks)**

4. Give the logic functions (using truth tables) performed by the following networks with MP neurons given in Figure 2

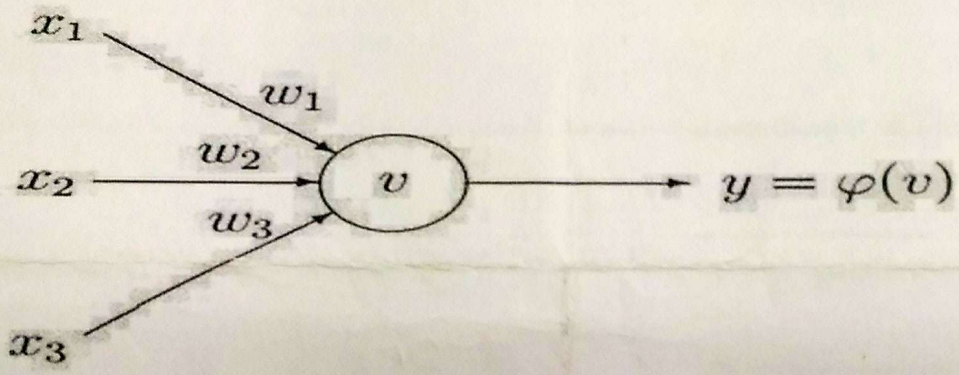

Figure 1: Single unit with three inputs. (For qn II 2.)

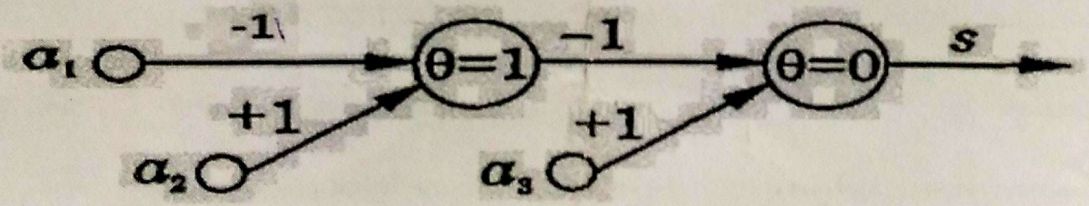

Figure 2: (For qn II 4.)

End of question paper.