2011

MCA

5th SEMESTER EXAMINATION

ELECTIVE—I

PAPER—3503

Full Marks : 100

Time : 3 Hours

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Illustrate the answers wherever necessary.
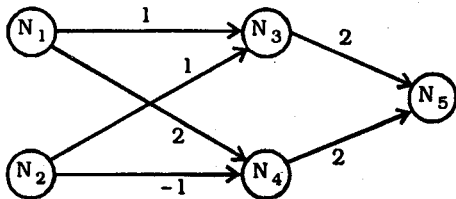
Neural Network

Answer any *five* questions   14×5

1. Consider the following neural network of McCulloch-Pitts neuron. Each neuron (other than the input neurons, N_1 and N_2) has a threshold of 2.

   (a) Define the response of neuron N_5 at time t in terms of the activations of the input neurons, N_1 and N_2, at the appropriate time.

(b) Show the activation of each neuron that results from an input signal of $N_1 = 1$, $N_2 = 0$ at t = 0.   7+7

2. Implement the NAND and NOR logic circuit using the MP model. Give the output of the network shown in Figure below for the input $[1\ 1\ 1]^T$ and $[2\ 1\ 0]^T$.   7+7
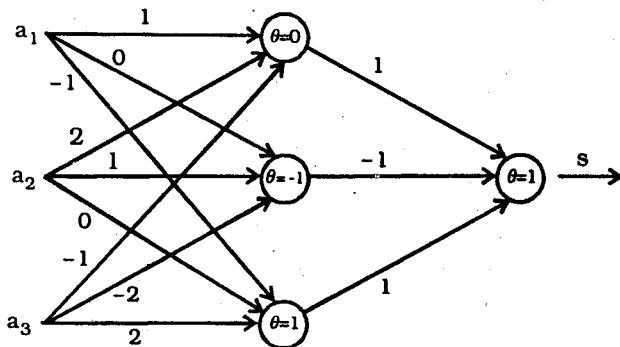
3. (a) Define Bias and Threshold of a neural network. Show that a bias can be used in place of a threshold in a neural network.

(Continued)

(b) Explain feed forward neural net with diagram.

(2+6)+6

4. Write and explain Hebb net algorithm with following example (with bias 1)

INPUT		TARGET
x_1	x_2	1
1	1	-1
1	-1	-1
-1	1	-1
-1	-1	-1

14

5. Describe Perceptron neural network model with AND gate logic function. 14

6. What is Perceptron Learning Rule Convergence Theorem. Prove the Theorem. 2+12

7. Consider a MAXNET with 4 neurons and inhibitory weight $\in$ = 0.2 and initial activations (input signals) are :

$a_1(0) = 0.2$ $a_2(0) = 0.4$ $a_3(0) = 0.6$ $a_4(0) = 0.8$

Write the algorithm and find out the final activations.

14

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(Turn Over)

Image Processing

Answer any *five* questions

1. (a) What are the major component of an image processing system ?

   (b) What do you understand by image sampling and quantization ?   10+4

2. (a) What do you mean by image enhancement ?   4

   (b) Explain different types of gray level transformation in spatial domain.   10

3. (a) What do you mean by Histogram processing ?   6

   (b) "Image can be enhance using Histogram equalization"— Explain with example.   8

4. (a) What is mark ?   2

   (b) Explain any two smoothing spatial filtering and two sharpening spatial filtering technique in spatial domain.   6+6

5. (a) What are the fundamental steps of frequency domain enhancement? 2

(b) Explain Bulterworth low pass and high pass filter in frequency domain. 3+3

(c) Explain Gaussion low pass and high pass filter in frequency domain. 3+3

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6. (a) What do you understand by morphological image processing? 2

(b) What do you understand by dilation and erosion? Prove the relation between them. 4+2

(c) What do you understand by opening and closing? Proof the relation between them. 4+2

7. (a) Define point and line detection. 2+2

(b) What are different edge detectors? Compare them. 6

(c) What do you understand by thresholding? How may an edge be detected using thresholding? 2+2

8. Write short note (any *two*) :   7×2

   (a) Neighbors of a pixel ;

   (b) Homomorphic fitering ;

   (c) Fourier transform.

Internal Assessment – 30

TB—75