Time: 3 Hours **Total Marks: 80**

N.B: (1) Question no 1 is compulsory

(2) Solve any **THREE** questions out of remaining five questions

(3) Figures to the right indicated full marks

(4) Assume suitable data whenever required and justify the same

Q.1 Attempt any Four questions: **(20)**

a. Explain the delta rule of learning with an example.

b. Explain Max- membership principle of defuzzification.

c. Differentiate between an artificial neural network and a digital computer

d. Write a short note on Adaptive Resonance Theory

e. Explain learning factors

Q.2

a. With a neat architecture, explain the training algorithm of kohonen self-organizing feature maps. (10)

b. Explain in details activation Functions. (10)

Q.3

a. Generate OR function using McCulloch-Pitts neuron model. (10)

b. A hetero associative net is trained by Hebb outer product rule for input row vectors S=(x_1, x2, x3, x4) to output row vectors t= (t_1, t_2). Find the weight matrix. (10)

S = (1 1 0 0) t = (1 0)

S = (1 1 1 0) t = (1 0)

S = (0 0 1 1) t = (1 0)

S = (0 1 0 0) t = (1 0)

Q.4

a. Construct Max net with 4 neurons and inhibitory weights €=0.2.The initial activations are: (10)

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

b. Discuss in detail the training algorithm used in back propagation network. (10)

Q.5

a. For the following noisy versions of training patterns, identify the response of network by segregating it into correct, incorrect and indefinite. (10)

(0 -1 1), (0 1 -1), (0 0 1), (0 0 -1), (0 1 0), (1 0 1),

(1 0 -1), (1 -1 0), (1 0 0), (1 1 0), (0 -1 0), (1 1 1)

b. Let the sets A,B,C and E be given as follows: (10)

E= all students enrolled in the university cricket club

A= male students, B= Bowlers, and C= Batsmen.

Draw individual Venn diagram to illustrate (i) female students
(ii) bowlers who are not batsman
(iii) female students who can both bowl and bat.

Q.6 Write a short note on (Any Two) (20)

a. Adaptive neuro-fuzzy information systems

b. McCulloch and Pitts models of neuron

c. Perceptron convergence theorem
