

SECTION C

3. Attempt any one part of the following: 10 x 1 = 10

- (a) Analyze the necessity of Activation function in ANN. Characterize different types of activation functions used in ANN.
- (b) Train a hetero-associative memory network using Hebb rule to store input row vector $s = (s_1, s_2, s_3, s_4)$ to the output row vector $t = (t_1, t_2)$. The vector pairs are given in table below:

Input Targets	s_1	s_2	s_3	s_4	t_1	t_2
1 st	1	0	0	0	1	0
2 nd	1	1	0	0	1	0
3 rd	0	0	0	1	0	1
4 th	0	0	1	1	0	1

4. Attempt any one part of the following: 10 x 1 = 10

- (a) Explain step by step procedure of back propagation learning algorithm in detail.
- (b) The input to a single input neuron is 2, weight is 2.3 and its bias is -3. Examine the neuron output for different transfer functions:
 - (i) Unit step with threshold value = 1
 - (ii) Linear with slope $m = 2$
 - (iii) Bipolar Sigmoidal with $\lambda = 0.5$

5. Attempt any one part of the following: 10 x 1 = 10

- (a) Explain the meaning of defuzzification in fuzzy logic controller. Describe different methods of defuzzification process.
- (b) A Rocket was launched carrying a satellite which will be reaching a distance of 22,300 miles at a speed of 4.9 m/s from Earth. During its path, the average speed (A) for every 20-minute intervals and fuel consumed (B) for every 2000 miles traveled is monitored. Given the fuzzy sets that follow.

$$\tilde{A} = \left\{ \frac{0.6}{20} + \frac{0.7}{40} + \frac{0.9}{60} + \frac{0.8}{80} + \frac{0.8}{100} + \frac{0.7}{120} \right\}$$

$$\tilde{B} = \left\{ \frac{0.9}{2000} + \frac{0.8}{4000} + \frac{0.7}{6000} + \frac{0.6}{8000} + \frac{0.3}{10000} + \frac{0.2}{12000} \right\}$$

Determine a relation $\tilde{R}$ that relates the average speed and fuel consumed.

6. Attempt any one part of the following: 10 x 1 = 10

- (a) For an air conditioner, what will be the input and output in a Fuzzy controller? Explain in details of Fuzzy Logic Controller for Classroom Air Conditioner.
- (b) Explain with example, the importance of fuzzy logic system in your own healthcare.

7. Attempt any one part of the following: 10 x 1 = 10

- (a) Explain synergy between neural-fuzzy system. Summarize different characteristics of it.
- (b) Analyze the different steps of the Fuzzy-backpropagation training.