VIT
Vellore Institute of Technology

SLOT – F2+TF2

SCHOOL OF INFORMATION TECHNOLOGY AND ENGINEERING

CONTINUOUS ASSESSMENT TEST – II - WINTER SEMESTER 2019-2020

Programme Name & Branch: B.Tech | **Class Number(s): VL201920500441**

Course Name Code: ITE1015 | **Course Name: Soft Computing**

Faculty Name(s): Prof.Senthil Kumar P

Exam Mode: Closed book

Exam Duration: 90 mins | **Maximum Marks: 50**

Answer ALL Questions (5 x 10=50)

1. Find the weight matrix in the bipolar form for the bidirectional associative memory using outer products rule for the following binary input-output vector pairs.

   s(1)=(1 0 0 0) t(1)=(0 1)

   s(2)= (0 1 1 0) t(2)=(1 0)

   Using the unit step function as the output unit activation function, test the response of the network on each of the input patterns. Also the test response of the network on each of the following noisy version of the data. i.[1 1 -1-1], ii.[1 1 1 -1]

2. Construct and test an associative discrete Hopfield network with input vector [1-111]. Test the network with missing and entries in first and fourth components of the stored vector.

3. Construct a Learning Vector Quantization (LVQ) net to cluster six vectors assigned to two classes. The following input vectors represent two classes 1 and 2. Perform only one epoch of training. Learning rate is 0.1

Vectors	Class
(1 0 0 1)	1
(1 1 0 0)	2
(0 1 1 0)	1
(1 0 0 0)	2
(0 0 1 1)	1
(0 1 0 1)	1

1·1 + 0.11

4. a. Explain with suitable diagram and examples of fuzzy equivalence relation. [4 marks]

b. Two relation are defined as

$$R = \begin{bmatrix} 1 & 0.2 & 0.3 & 0 \\ 0.2 & 0.4 & 0.5 & 0.6 \\ 0.3 & 0.4 & 0.6 & 0.9 \\ 0 & 0.2 & 0.9 & 1 \end{bmatrix}$$

$$S = \begin{bmatrix} 1 & 0.5 \\ 1 & 0.5 \\ 0.5 & 1 \\ 0.5 & 1 \end{bmatrix}$$

a) Find the relation R ∘S using max-min composition. [3marks]

b) Find the relation R •S using max-product composition [3 marks]

5. a. Using inference method, find the membership values of the triangular shapes (I,R,E,IR,T) for a triangle with angles 35°,75°,70°. [5 Marks]

b. Determine the crisp λ-cut relation when λ = 0.1,0$^+$, 0.3, 1 and 0.9 for the following relation R

$$R = \begin{bmatrix} 0 & 0.2 & 0.4 \\ 0.3 & 0.7 & 0.1 \\ 0.8 & 0.9 & 1.0 \end{bmatrix}$$

[5 marks]

$$\begin{bmatrix} 0 & 1 \\ 1 & 0 \\ 1 & 0 \\ 0 & 0 \end{bmatrix} \begin{bmatrix} 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & 0 \\ 0 & 1 \\ 0 & 1 \\ 0 & 0 \end{bmatrix}$$

1 - 1/90