

16295(D) - 0 DEC 2016

**B. Tech 8th Semester Examination**

**Principles of Soft Computing (NS)**

EC-423

**Time : 3 Hours**

**Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

**Note :** Attempt all questions. Section-E is compulsory.

**SECTION - A**

1. Four steps of Hebbian learning of a single neuron network have been implemented starting with  $w[-1 \ 1]$  for learning constant  $c=1$  using input as follows:

$$x_1 = \begin{bmatrix} 1 \\ -2 \end{bmatrix} \quad x_2 = \begin{bmatrix} 0 \\ 1 \end{bmatrix} \quad x_3 = \begin{bmatrix} 2 \\ 3 \end{bmatrix} \quad x_4 = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$$

Draw the neuron model for this problem and find the final weights after four steps for bipolar continuous  $f(\text{net})$ ,  $\lambda=1$ .

OR

Explain perceptron training algorithm for single and multiple output class. (20)

**SECTION - B**

2. How do neurons act as auto associative memory? Explain the functioning with a three neuron model.

OR

Explain Kohonen self organizing feature maps. (20)

**SECTION - C**

3. Let X be the universe of military aircraft of interest, as defined here:

$$X = \{a10, b52, b117, c5, c130, f4, f14, f15, f16, f111, kc130\}$$

Let X be the fuzzy set of bomber class aircraft :

$$A = \left\{ \frac{0.2}{f16} + \frac{0.4}{f4} + \frac{0.5}{a10} + \frac{0.5}{f14} + \frac{0.6}{f15} + \frac{0.8}{f111} + \frac{1.0}{b117} + \frac{1.0}{b52} \right\}$$

Let B be the fuzzy set of fighter class aircraft:

$$B = \left\{ \frac{0.1}{f117} + \frac{0.3}{f111} + \frac{0.5}{f4} + \frac{0.8}{f15} + \frac{0.9}{f14} + \frac{1.0}{f16} \right\}$$

Find the following various set combinations for these two sets:

- |                             |                              |                       |
|-----------------------------|------------------------------|-----------------------|
| (i) $A \cup B$              | (ii) $A \cap B$              | (iii) $\bar{A}$       |
| (iv) $\bar{B}$              | (v) $A B$                    | (vi) $B A$            |
| (vii) $\overline{A \cup B}$ | (viii) $\overline{A \cap B}$ | (ix) $\bar{A} \cup B$ |

OR

Explain Yagers Union, Intersection and Complement with example. (20)

**SECTION - D**

4. Explain Schema theorem with the help of suitable example.

OR

Explain traveling sales person problem with the help of suitable example. (20)

**SECTION - E**

5. Explain following:-
- What is perceptron?
  - Convex fuzzy set.
  - Differentiate crisp set and fuzzy set.
  - What is defuzzification?
  - Tournament selection.
  - What is selection operator? Explain one of the selection mechanisms except (v).
  - Compare hard computing and soft computing.
  - Explain recombination operators.
  - What is Alpha cut in fuzzy set?
  - Define hamming networks. (10×2=20)