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:

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

   Draw the neuron model for this problem and find the final weights after four steps for bipolar continuous f(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:-
   (i)   What is perceptron?
   (ii)   Convex fuzzy set.
   (iii) Differentiate crisp set and fuzzy set.
   (iv)   What is defuzzification?
   (v)   Tournament selection.
   (vi)   What is selection operator? Explain one of the selection mechanisms except (v).
   (vii) Compare hard computing and soft computing.
   (viii) Explain recombination operators.
   (ix)   What is Alpha cut in fuzzy set?
   (x)   Define hamming networks.   (10×2=20)