Paper Code: OE-041	**Roll No.**										

B.Tech.
(SEM IV) EVEN SEMESTER EXAMINATION, 2015-16
SOFT COMPUTING

[Time: 3 hrs.] **[Max. Marks: 100]**

Note: (i) Attempt ALL questions.
(ii) Make suitable assumption if required.

1. Attempt any FOUR parts of the following:- **[5x4=20]**

(a) Define soft computing. How is it different from hard computing?
(b) Draw structure of a simple artificial neuron and discuss the calculation of net input.
(c) What is meant by learning? How is supervised learning differing from unsupervised learning?
(d) Construct a recurrent network with four input nodes, three hidden nodes and four output nodes that has lateral inhibition structure in the output layer.
(e) What is the necessity of activation function? List the commonly used activation functions.
(f) Discuss the working of associative memory.

2. Attempt any TWO parts of the following: - **[10x2=20]**

(a) Explain the simple perceptron model. Explain why perceptron cannot handle tasks which are not linearly separable.
(b) State the importance of back propagation algorithm and discuss the some application areas of back propagation networks.
(c) Discuss the hidden layer computation of back propagation for the sigmoidal function.

3. Attempt any TWO parts of the following:- **[10x2=20]**

(a) Define the fuzzy set. Discuss the fuzzy versus crisp with suitable example.

(b) Two Fuzzy sets I and F are defined as

$$I = \{(A,0.2),(B,0.5),(C,0.6)\} \quad F = \{(A,0.1),(B,0.4),(C,0.5)\}$$

Find (i) $\mathbf{I} \cup \mathbf{F}$ (ii) $\mathbf{I} \cap \mathbf{F}$ (iii) $\mathbf{I} - \mathbf{F}$ (iv) $\mathbf{I} \cdot \mathbf{F}$ (v) $\mathbf{I} \cdot \mathbf{0.3}$

(c) Two fuzzy relations are given by

$$R = \begin{bmatrix} 0.6 & 0.3 \\ 0.2 & 0.9 \end{bmatrix} \qquad S = \begin{bmatrix} 1 & 0.5 & 0.3 \\ 0.8 & 0.4 & 0.7 \end{bmatrix}$$

Obtain fuzzy relation *T* as a composition between the fuzzy relations using Max-min composition and Max-product composition.

4. Attempt any TWO parts of the following: - **[10x2=20]**

(a) (i) Define the fuzzy proposition. What are the different fuzzy connectives used for forming the compound fuzzy proposition.

(ii) Consider the fuzzy proposition:
P: Mary is efficient with T(P) = 0.7
Q: Ram is efficient with T(Q) = 0.58
Find the fuzzy truth value of the following propositions:
A. Marry is not efficient.
B. Marry is efficient and so is Ram.
C. Either Ram or Marry is efficient.
D. If marry is efficient then so is Ram.

(b) Let X = { a, b, c, d} , Y= { 1, 2, 3, 4} and
A = {(a, 0), (b, 0.8), (c, 0.6), (d, 1)}
B = {(1, 0.2), (2, 1), (3, 0.8), (4, 0)}
C = { (1, 0), (2, 0.4), (3, 1), (4, 0.8)}

Determine the implication relations
(i) IF x is A THEN y is B
(ii) IF x is A THEN y is B ELSE y is C.

(c) What do you mean by defuzzification? What are the different methods of defuzzification? Explain any one.

5. Attempt any TWO parts of the following:- **[10x2=20]**

(a) What is Genetic Algorithm? Describe the working principle of GA. State the importance of GA.

(b) Discuss the Cross over and Mutation operator used in GA.

(c) What are the different application domains of GA.