(Please write your Exam Roll No.) Exam Roll No. .....

END TERM EXAMINATION

EIGHTH SEMESTER [B.TECH] MAY-JUNE 2017

Paper Code: ETCS-406 **Subject: Soft Computing**

Time: 3 Hours **Maximum Marks: 75**

Note: Attempt any five questions including Q.no.1 which is compulsory.

Q1 Answer following in brief **(any five)**: **(5x5=25)**

(a) What is the difference between the classic proposition and fuzzy proposition.
(b) What do you mean by fuzzy propositions? Give any two examples from daily life.
(c) What is the necessity of activation functions?
(d) Explain extension principle using suitable example.
(e) Give an example of crossover operator, mutation operator and selection operator.
(f) Define fuzzy set and explain fuzzy set operations. Discuss properties of fuzzy sets.

Q2 (a) Let A be a fuzzy set defined by: $A = 0.5/x_1 + 0.4/x_2 + 0.7/x_3 + 0.8/x_4 + 1/x_5$. Find α-cuts and strong α-cuts of A. **(6)**

(b) What is alpha-cut? How it is useful in creating crisp set? **(6.5)**

Q3 (a) State and explain the classifications of the parallel genetic algorithm. **(6)**

(b) Four steps of Hebbian learning of a single-neuron network have been implemented starting with $w^1 = [1, -1]^t$ for learning constant c = 1 using inputs 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 weight after four steps for bipolar continuous f(net), $\lambda = 1$. **(6.5)**

Q4 (a) Explain the associative memory and its functioning using neat diagram. **(6)**

(b) Explain following terms associated with associative memory: **(6.5)**

(i) Association
(ii) Heteroassociation
(iii) Learning
(iv) Retrieval
(v) Reliability of the answer

Q5 (a) What is a feedforward neural network? Differentiate between the learning phase and the classification phase. **(6)**

(b) Design the steps involved to solve any one of the optimization problem using Hopfield neural network. State the problem clearly and explain the mapping of the same to the Hopfield network. **(6.5)**

Q6 (a) Differentiate fuzzy set and crisp set and mention and limitations of fuzzy system? **(6)**

(b) Mention one application of Fuzzy logic and elaborate why fuzzy systems are used? **(6.5)**

Q7 (a) With reference to fuzzy sets, explain cardinality of fuzzy sets, height of fuzzy sets and empty fuzzy sets. **(6)**

(b) What is the difference between alpha or lambda cut set? How many fuzzy relation can be converted into a crisp relation using lamda-cut process? Explain any one method of deffuzzification. **(6.5)**

Q8 (a) State the importance of genetic algorithm. Explain travelling salesman problem and its optimization using genetic algorithms. **(6)**

(b) Compare feed-forward network and feedback network. **(6.5)**

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