MCTA–201

M. E./M. Tech. (S. S.) (Second Semester)

EXAMINATION, June, 2012

(Grading/Non-Grading)

SOFT COMPUTING

(MCTA–201)

Time : Three Hours

Maximum Marks : {*GS : 70*, *NGS : 100*}

Note : Attempt any *five* questions. All questions carry equal marks.

1. (a) What do you mean by Genetic Algorithms ? Explain any *two* basic operators that all genetic algorithms contain.

   (b) What is Reinforcement Rule ? Explain its various types.

2. (a) Generate X-OR function using McCulloch-Pitts neuron models.

   (b) What are the similarities and dissimilarities between Fuzzy logic and Neural networks ?

3. (a) Derive the backpropagation training algorithm for the case where the activation function is an arctan function.

   (b) Let $X = \{a, b, c, d\}$, $Y = \{1, 2, 3, 4\}$

   and $A = \{(a, 0), (b, 0{\cdot}8)\ (c, 0{\cdot}6)\ (d, 1)\}$

   $\tilde{B} = \{(1, 0{\cdot}2)\ (2, 1)\ (3, 0{\cdot}8)\ (4, 0)\}$

   $\tilde{C} = \{(1, 0)\ (2, 0{\cdot}4)\ (3, 1)\ (4, 0{\cdot}8)\}$

   Determine the implication relation :

   (i) If x is $\tilde{A}$ THEN y is $\tilde{B}$.

   (ii) If x is $\tilde{A}$ THEN y is B. ELSE y is $\tilde{C}$.

4. (a) Explain with the help of an example the concept of simple fuzzy logic controllers.

   (b) Solve the non-linear optimization problem :

   Minimize :

   $$(X_1 - 1{\cdot}5)^2 + (X_2 - 4)^2$$

   Subject to :

   $$(4{\cdot}5\, X_1 + X_2^2 - 18 \le 0)$$

   $$(2\, X_1 - X_2 - 1 \ge 0)$$

   $$0 \le X_1, X_2 \ge 4$$

   Show calculations for three generations. Use cross over probability as 80% and a mutation probability of 3%.

5. (a) What do you understand by Regression tree in Neuro-Fuzzy modeling ? How does it differ from the classification tree ?

   (b) Explain the concept of clustering. Explain any *two* methods of data clustering.

6. (a) Differentiate between the following :

   (i) Simple Hill climbing and Simulated annealing hill climbing

   (ii) A* and AO*

(b) List and discuss the two simple extreme cases that exist in determining an aggregation strategy of fuzzy rule.

7. Write short notes on any *three* of the following :
   (a) Frames
   (b) Rules interference
   (c) Rank method
   (d) Hopfield network
   (e) Evolutionary computation