

**ALCCS – NEW SCHEME**

Time: 3 Hours

**AUGUST 2013**

Max. Marks: 100

*PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.*

**NOTE:**

- Question 1 is compulsory and carries 28 marks. Answer any FOUR questions from the rest. Marks are indicated against each question.
- Parts of a question should be answered at the same place.

- Q.1**
- Draw fuzzy membership Function to describe cold, warm and hot water.
  - Let A and B be two fuzzy sets with  $\mu_A(x) = 0.2$  and  $\mu_B(x) = 0.1$ , For the rule: If A or B then C, what is fuzzy membership of C?
  - Compare supervised learning and unsupervised learning.
  - What is McCulloch and Pitts model for an artificial neuron?
  - How genetic algorithms perform better result as compared to traditional approaches?
  - Compare Biological Ant Colony System with Simulated Ant colony system.
  - Write any four properties of rough membership function. (7×4)
- Q.2**
- What is meant by soft computing? What are various constituents of soft computing methodology? Briefly describe the strengths of each of these methodologies. (9)
  - With Neuro-fuzzy modeling as a backbone, describe at least five characteristics of soft computing. (9)
- Q.3**
- Let R and S be two fuzzy relations given below:

$$R = \begin{matrix} & 0.3 & 0.8 & 0.4 \\ 0.6 & 0.9 & 0.1 \\ 0.2 & 0.5 & 0.6 \end{matrix}$$

$$S = \begin{matrix} & 0.2 & 0.8 & 0.4 \\ 0.7 & 0.9 & 0.1 \\ 0.8 & 0.3 & 0.5 \end{matrix}$$

**Code: CT79**

**Subject: SOFT COMPUTING**

- (i) If  $R = \text{"x considerably larger than y"}$  and  $S = \text{"y very close to x"}$  then give the matrices defining fuzzy relations  $\text{"x considerably larger or very close to y"}$  and  $\text{"x considerably larger and very close to y"}$   
 (ii) Find the composition relation  $RoS$ . **(10)**
- b. Give fuzzy logic inference mechanism for the following rule under fuzzy logic. The rule:  
 IF A THEN B ELSE C where A= very small, B=very large and C=NOT very large.  
 small and large are defined as under  
 small= $1/1+0.8/2+0.4/3+0.2/4+0/5$   
 large= $0/1+0/2+0/4+0.8/4+1/5$   
 If A has size=4, then what would be the resultant inference **(8)**
- Q.4** a. What is back propagation learning? Explain forward pass and backward pass in conjunction with back propagation learning. Shall it be called unsupervised learning? Why? **(8)**
- b. What is the Hopfield Network? Can it be possible to use Hopfield Network for error correction? Justify your answer with an example. **(5)**
- c. What are the phases of the Adaptive Process of Self-Organizing Map (SOM)? Describe these. **(5)**
- Q.5** a. How can Fitness functions be found for any optimization problem? Explain, in detail, Fitness Function in Genetic algorithm. **(6)**
- b. Explain the effects of selection, crossover and mutation in evolutionary computation. How is the population affected by the use of each one of these operators? **(6)**
- c. What do you mean by Particle Swarm Optimization (PSO)? Explain PSO algorithm. **(6)**
- Q.6** a. Write down main advantages of using Rough set approach used in wide variety of applications like in machine learning, knowledge discovery, data mining, expert systems, approximate reasoning and pattern recognition. **(9)**
- b. Let  $S = (U, A)$  be an information system and let  $B \subseteq A$ , and  $X \subseteq U$ , define the following terms using suitable example(s):  
 (i) B-lower and B-upper approximations of X  
 (ii) internally and externally B-undefinable  
 (iii) roughly B-definable and totally B-undefinable **(9)**
- Q.7** Write notes on any three of the following giving suitable examples wherever required:  
 (i) Hybrid systems and its applications  
 (ii) Fuzzy filtered neural networks  
 (iii) Genetic algorithm for neural network design  
 (iv) Fuzzy logic and genetics algorithm for optimization **(6\*3)**