

C9-R4: SOFT COMPUTING

NOTE:

1. Answer question 1 and any FOUR from questions 2 to 7.
2. Parts of the same question should be answered together and in the same sequence.

Time: 3 Hours

Total Marks: 100

1.

- a) What is soft computing? How the hybridization of various technologies can be done? What are the applications of soft computing?
- b) What are the characteristics of the problem that are to be analyzed when choosing an application method to solve the problem? Explain.
- c) How Fuzzy Logic is different from conventional control System?
- d) Describe and compare various selection techniques: Roulette Wheel Selection, Tournament Selection and Rank based selection.
- e) What do you mean by Fuzzy decision making?
- f) What is meant by activation function in an artificial neuron model? Describe the various activation functions that are employed and compare their merits and demerits.
- g) "Genetic Algorithms always perform better." Justify.

(7x4)

2.

- a) List the features of fuzzy-NN. Explain the term fuzzy distance.
- b) Define Genetic Algorithm (GA). How can we improve the Performance of Genetic Algorithm? What are the drawbacks of GA.? What is (are) the stopping criteria used while executing GA? How GA is useful for solving nonlinear optimization problems?
- c) Explain the fuzzy set theory in brief. Describe fuzzification techniques. Give fuzzy set representation of small integers.

(6+6+6)

3.

- a) Define Encoding System in GA. Write and Give the Encoding representation as an example for one specific Problem.
- b) Explain Fuzzy Inference System in detail with its block diagram.
- c) Discuss the effect of learning rate, initial weight values, momentum term and number of hidden neurons on neural network learning.

(6+6+6)

4.

- a) Is back propagation required in Neural Network? How does back propagation give the performance through time?
- b) Justify the use of fuzzy logic in soft computing. What are the criticisms for Fuzzy Logic?
- c) Describe various crossover techniques for GA.

(6+6+6)

5.

- a) Define crossover Rate and Mutation Rate. What should be the crossover rate and mutation rate to solve optimization problem in GA?
- b) List the important features of fuzzy-NN hybrid intelligent system in the context of soft computing. Justify the usage of the fuzzy-NN hybridization.
- c) Explain the difference found in representing structured knowledge using fuzzy logic and neural system.

(6+6+6)

6.

- a) Why there is a need for hybridization of various soft computing techniques? How GA play important role with integration of other technology? Explain in details.
- b) With a block diagram explain the working of a fuzzy controller. List down the assumptions made in a fuzzy control system design.
- c) Explain the following Soft Computing (Hybridization) Techniques with their significance and applications:
 - i) Neuro-Genetic Hybrid Intelligent System
 - ii) Neuro-Genetic-Fuzzy Hybrid Intelligent System

(6+6+6)

7.

- a) Let Y and R be two fuzzy sets of young and rich people. What is the member grade of person being young and rich if the member grade of a person being young is 0.8 and being rich is 0.7?
- b) Explain the steps in the solution of a general optimization problem, by a Neural Networks and a Genetic Algorithm.
- c) How selection of candidates for mating pool will affect the convergence of a Genetic Algorithm? Why the various operators are required in the Genetic Algorithm?

(6+6+6)