

003604

May, 2023

**B.Tech. (CE/IT/CSE/CSE(AIML) - VI Semester
Soft Computing (PEC-CSD-602)**

Time : 3 Hours]

[Max. Marks : 75

Note : Question number 1 is compulsory. Attempt any four questions from Part-B.

PART-A

1. (a) What is the need of mutation? How is it implemented in Genetic Algorithm? (1.5)
- (b) Discuss the structure of a biological neuron. (1.5)
- (c) Differentiate between supervised and unsupervised learning. (1.5)
- (d) What are the basic building blocks in Artificial Neural Network? (1.5)
- (e) List the properties of fuzzy sets? (1.5)
- (f) Discuss advantages of Genetic Algorithm over conventional search techniques like hill climbing. (1.5)
- (g) What is the difference between Artificial Intelligence and Computational Intelligence? (1.5)

- (h) What do you understand by premature convergence to solution? (1.5)
- (i) What encoding scheme should be used in ordering problems such as TSP in genetic algorithm? (1.5)
- (j) Write a brief note on KNN algorithm for machine learning. (1.5)

PART-B

2. (a) Explain the different types of crossover operations in binary encoding in Genetic Algorithm. (7.5)
- (b) What is fuzzy relation? Discuss the different operations on fuzzy relations. (7.5)
3. (a) What is the roulette wheel selection in Genetic Algorithm? Illustrate. (7.5)
- (b) Write a note on rule editor of FIS in MATLAB. (7.5)
4. (a) Give De Morgan's law and Excluded middle laws for fuzzy sets. (7.5)
- (b) What is meant by an activation function in an artificial neuron model? Describe the various activation functions that are employed. (7.5)

5. (a) What do you understand by a normal fuzzy set? Define prototype of the set and convex fuzzy set. (7.5)
- (b) What is Hebbian learning? Explain. (7.5)
6. (a) How do you create a fuzzy object in MATLAB? Explain. (7.5)
- (b) What is an expert system? Discuss the architecture of fuzzy expert system. (7.5)
7. (a) Explain the back-propagation algorithm and derive the expressions for weight update relations. (7.5)
- (b) What are the basic elements of a fuzzy logic control system? Give the structure of a fuzzy production rule system. (7.5)