

Roll No. ....

Total Pages : 03

**020603**

**May 2024**

**B. Tech. (RAI) (Sixth Semester)**

**Soft Computing (PCC-RAI-603-21)**

*Time : 3 Hours*

*[Maximum Marks : 75*

**Note :** It is compulsory to answer all the questions (1.5 marks each) of Part A in short. Answer any *four* questions from Part B in detail. Different sub-parts of a question are to be attempted adjacent to each other.

**Part A**

1. (a) Define the following in the context of fuzzy sets : support, membership. **1.5**
- (b) Define the following in the context of fuzzy sets : alpha cut, height. **1.5**
- (c) What is the purpose of mutation in GA ? **1.5**
- (d) What is the role of knowledge base in a Fuzzy Inference System ? **1.5**
- (e) Name any *three* commonly used signal functions used in the Artificial Neural Network domain and draw their graph (No description required). **1.5**

- (f) For what kind of problems GA is a suitable solution tool ? 1.5
- (g) What is purpose of crossover in a GA based solution ? 1.5
- (h) Explain why a single perceptron cannot be trained for a XOR type classification. 1.5
- (i) Differentiate between a classification and regression problem. 1.5
- (j) What is a fuzzy number ? 1.5

**Part B**

- 2. (a) With the help of a suitable example, explain how GA can be used to find the optimal solution of a problem. 6
- (b) Explain the evolution of computational intelligence from artificial intelligence. 6
- (c) What are the main constituents of soft computing ? 3
- 3. (a) Illustrate the concept of fuzzy decision making with the help of a suitable example, say selection of a job. 7
- (b) Write the axioms related to  $t$ -conorm used for the purpose of union of fuzzy sets. 4
- (c) Define the fuzziness of fuzzy sets. At what membership it is highest and why ? 4

- 4. (a) What is a qualified Fuzzy proposition ? How its truth value found ? 5
- (b) Make the block diagram of a Fuzzy expert system and explain the purpose of its various parts. 10
- 5. (a) Define a Fuzzy set 'Near' to show the proximity between two cities. Develop a Fuzzy relation  $R$  such that  $c_1 R c_2$  iff  $c_1$  is near  $c_2$ . 6
- (b) Write a short note on Adaptive Resonance Theory (ART) networks. 6
- (c) Differentiate between supervised and unsupervised learning. 3
- 6. (a) Describe the working of Radial Basis Networks. 6
- (b) Describe the working of a Multilayer Perceptron Model. 6
- (c) Write a short note on reinforcement Learning. 3
- 7. Write short notes on the following :
  - (a) Machine Learning Approach to Knowledge Acquisition 8
  - (b) Applications of GA in Machine Learning 7