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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 a 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**