7. Explain Unsupervised Learning Neural Networks and Adaptive Resonance Theory (ART). Discuss their working and applications. **14**

Unit IV

8. Explain the working of Genetic Algorithms. Discuss the following operators : selection, crossover, mutation operators with flowchart and example. **14**

9. Discuss Applications of Genetic Algorithms in Machine Learning. Explain optimization and feature selection problems. **14**

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(T) Roll No. .....

PAPER ID—11449

B.Tech. EXAMINATION, 2026

(Sixth Semester)

SOFT COMPUTING

Professional Elective Course-II

Time : 3 *Hours* *Maximum Marks :* 70

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. **1** is compulsory. All questions carry equal marks.

1. (a) Define the 'Soft' in Soft Computing.

   (b) What is the significance of the 'Crossover' operator in Genetic Algorithms ?

   (c) State the difference between a Crisp Set and a Fuzzy Set.

   (d) Briefly explain the 'Winner-Take-All' learning rule in Neural Networks.

   (e) What is a 'Linguistic Variable' in Fuzzy Logic ?

   (f) Define 'Exploration *vs.* Exploitation' in Reinforcement Learning.

   (g) What is the 'Fitness Function' used for ?

7×2=14

Unit I

2. Explain the transition from Conventional AI to Computational Intelligence. Describe the fundamental building blocks of Machine Learning as a subset of Computational Intelligence. **14**

3. Elaborate on the "Constituents of Soft Computing." Why is a hybrid approach often more effective than using a single technique ? **14**

Unit II

4. Given two fuzzy sets A and B, explain the standard operations : Union, Intersection, Complement and Algebraic Product. Provide a numerical example for each using discrete membership values. **14**

5. What are Fuzzy Expert Systems ? Explain their components and discuss how they differ from classical rule-based expert systems. **14**

Unit III

6. Explain Feedforward Neural Networks and Supervised Learning. Describe training using backpropagation algorithm with suitable diagrams. **14**