RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Artificial Intelligence & Data Science, VII-Semester

Departmental Elective-702 (C) Computational Intelligence

Course Outcomes:

After completing the course student should be able to:

1. Describe in-depth about theories, methods, and algorithms in computation Intelligence.
2. Compare and contrast traditional algorithms with nature inspired algorithms.
3. Examine the nature of a problem at hand and determine whether a computation intelligent technique/algorithm can solve it efficiently enough.
4. Understand Swarm Intelligence techniques.
5. Design and implement Computation Intelligence algorithms and approaches for solving real-life problems.

Syllabus

UnitI: **Introduction to Computational Intelligence**: Types of Computational Intelligence, components of Computational Intelligence. Concept of Learning, Training model. Parametric Models, Nonparametric Models. Multilayer Networks: Feed Forward network, Feedback network.

UnitII:Fuzzy Systems: Fuzzy set theory: Fuzzy sets and operations, Membership Functions, Concept of Fuzzy relations and their composition, Concept of Fuzzy Measures; Fuzzy Logic: Fuzzy Rules, Inferencing; Fuzzy Control - Selection of Membership Functions, Fuzzyfication, Rule Based Design & Inferencing, Defuzzyfication.

UnitIII:Genetic Algorithms: Basic Genetics, Concepts, Working Principle, Creation of Offspring, Encoding, Fitness Function, Selection Functions, Genetic Operators-Reproduction, Crossover, Mutation; Genetic Modelling, Benefits.

UnitIV:Rough Set Theory: Introduction, Fundamental Concepts, Set approximation, Rough membership, Attributes, Optimization. Hidden Markov Models, Decision tree model.

UnitV:Introduction to Swarm Intelligence: Swarm Intelligence Techniques: Ant Colony Optimization, Particle Swarm Optimization, Bee Colony Optimization etc. Applications of Computational Intelligence.

Recommended Books:

1. Russell C. Eberhart and Yuhui Shi, Computational Intelligence: Concepts to Implementations, Morgan Kaufmann Publishers.
2. Andries P. Engelbrecht, Computational Intelligence: An Introduction, Wiley Publishing.
3. Simon Haykin, Neural Networks: A Comprehensive Foundation, Prentice Hall.
4. David E. Goldberg, Genetic Algorithm in Search Optimization and Machine

Learning, Pearson Education.
6. Jagdish Chand Bansal, Pramod Kumar Singh, Nikhil R. Pal, Evolutionary and Swarm IntelligenceAlgorithms, Springer Publishing, 2019.
7. S. Rajeskaran, G.A. VijaylakshmiPai, “Neural Networks, Fuzzy Logic, GeneticAlgorithmsSynthesis and Applications”.
8. J.S. Roger Jang, C.T. Sun, E. Mizutani, “Neuro-Fuzzy and Soft Computing: A ComputationalApproach to Learning & Machine Intelligence”, PHI, 2002.