EC320: Soft Computing

Details of course:-

Course Title	Course Structure			Pre-Requisite
	L	T	P	
Soft computing	3	1	0	Basic mathematics

Course Objective: A comprehensive of soft computing techniques and their applications in solving real-world problems.

Course Outcomes:

CO1: Explain the fundamental concepts of soft computing techniques and their applications.
CO2: Analyze various neural network architectures.
CO3: Design fuzzy systems
CO4: Explain fundamentals and operators of Genetic Algorithm.
CO5: Apply soft computing techniques to solve real time problems.

S. No.	Content	Contact Hours
Unit 1	Introduction of soft computing, Soft Computing vs. Hard Computing, various types of Soft Computing Techniques, Applications of Soft Computing. Elementary search techniques: introduction to artificial intelligence, Breadth First Search, Depth First Search Techniques, other Search Techniques like Hill Climbing, Best First Search, A* Algorithm, AO* Algorithms and various types of Control Strategies, production systems	12
Unit 2	Neural Networks: Structure and Function of a single neuron: Biological Neuron, Artificial Neuron, definition of ANN, Taxonomy of Neural Net, Difference between ANN and Human Brain, Characteristics and Applications of ANN. Single Layer Network, Perceptron Training Algorithm.	10
Unit 3	Fuzzy Logic: Fuzzy set theory, Fuzzy Set Vs Crisp Set, Crisp relation & Fuzzy Relations. Fuzzy systems: Crisp Logic, Fuzzy Logic, Introduction & Features of Membership Functions. Fuzzy rule base system: Fuzzy Propositions, Formation, Decomposition & Aggregation of Fuzzy Rules, Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Decision Making & Applications of Fuzzy Logic.	10

Unit 4	Genetic Algorithm: Fundamentals, basic concepts, working principle, encoding, fitness function, reproduction. Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of GA, Applications & advances in GA. Fuzzification: Differences & similarities between GA & other traditional method.	10
	Total	42

Books:-

S. No	Name of Books/Authors/Publisher
1	Principles of Soft Computing/S. N. Sivanandam and S. N. Deepa / 3rd Ed, Wiley, 2018.
2	Soft computing: fundamentals and applications /Pratihar and Dilip Kumar/ 2nd Ed, Alpha Science International, Ltd. 2013.
3	Fuzzy Logic, Intelligence, Control and Information /J. Yen and R. Langari /1st Ed, Pearson Education, 2022.
4	Artificial Intelligence Foundations of Computational Agents/David L. Poole and Alan K. Mackworth/ 3rd Ed,Cambridge university press, 2023.
5	Introduction to Soft Computing: Neuro-fuzzy and Genetic Algorithms /Samir Roy/ 1st Ed,Pearson India, 2013.