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| COURSE CODE: 1152EE201 | | COURSE TITLE: APPLIED SOFT COMPUTING | | | | L | T | P | C | | | |
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| COURSE CATEGORY: Program Elective | | | | | | | | | | | | |
| PREAMBLE : This course will cover fundamental concepts of Artificial Neural Networks (ANNs), Fuzzy logic (FL) and optimization techniques using Genetic Algorithm (GA), PSO, DE etc. | | | | | | | | | | | | |
| PREREQUISITE COURSES: Nil | | | | | | | | | | | | |
| COURSE EDUCATIONAL OBJECTIVES : | | | | | | | | | | | | |
| <ul style="list-style-type: none"> To Understand the fuzzy logic operations, relations and inference systems To Understand the architecture, learning methodologies of perceptron and back propagation algorithm To know basics of genetic and differential evolution algorithm To study different optimization techniques –PSO, Firefly, Artificial BEE algorithm etc To study soft computing techniques applications related to electrical engineering | | | | | | | | | | | | |
| COURSE OUTCOMES : Upon the successful completion of the course, students will be able to: | | | | | | | | | | | | |
| CO Nos. | Course Outcomes | | | | | Knowledge Level (Based on revised Bloom's Taxonomy) | | | | | | |
| CO1 | Define fuzzification and defuzzification and can explain the working of fuzzy logic controller | | | | | K2 | | | | | | |
| CO2 | Explain the architecture of neural network, supervised and unsupervised learning | | | | | K2 | | | | | | |
| CO3 | Explain process and steps in developing a genetic and differential evolution algorithm | | | | | K2 | | | | | | |
| CO4 | Explain the steps of different optimization algorithms and how to apply for a given optimization problem | | | | | K2 | | | | | | |
| CO5 | Apply soft computing techniques for electrical engineering problems | | | | | K3 | | | | | | |
| CORRELATION OF COs AND POs | | | | | | | | | | | | |
| CO'S | PO₁ | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | L | M | | | | | M | H | L | M | | |
| CO2 | L | | | | | | | H | L | M | | |
| CO3 | L | | | | | | | H | L | M | | |
| CO4 | L | M | | | H | | M | H | L | H | | |
| CO5 | L | M | | | H | | M | H | L | H | | |
| COURSE CONTENT : | | | | | | | | | | | | |
| UNIT I | FUZZY LOGIC | | | | | | | | 7 | | | |
| Fuzzy sets- logic operations and relation, fuzzy decisions making, fuzzy inference systems, design of fuzzy logic controller. | | | | | | | | | | | | |

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| UNIT II | ARTIFICIAL NEURAL NETWORKS | 7 |
| Artificial neuron-Supervised and unsupervised learning-single layer perceptron, and multi-layer perceptron, back propagation neural network. | | |
| UNIT III | EVOLUTIONARY ALGORITHM | 7 |
| Genetic algorithms: Introduction-genetic algorithm steps-selection, crossover, and mutation-Deferential Evolution Algorithm | | |
| UNIT IV | SWARM INTELLIGENCE | 9 |
| Particle swarm optimization(PSO)-Firefly algorithm(FA), Artificial BEE optimization(ABC) -Cat swarm optimization(CSO)-Bacterial foraging optimization(BFO) | | |
| UNIT V | LIST OF EXPERIMENTS | 15 |
| Case studies of soft computing applications to electrical engineering problems using MATLAB/SCI LAB | | |
| <ul style="list-style-type: none"> a) Application of fuzzy logic for temperature control in refrigerator b) Fuzzy logic controller for speed control of stepper motor c) Emulating logic gates with a neural network d) Applications of genetic algorithm for speed control of induction motor e) Swarm intelligence for optimization problem in electrical engineering | | |
| TOTAL: 45 PERIODS | | |
| TEXT BOOKS: | | |
| <ol style="list-style-type: none"> 1. S.N.Sivanandam and S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt Ltd, 2011. 2. Timothy Ross, " Fuzzy Logic with Engineering Applications" ,(Mc GrawHill) 3. Jang, J.S.R., Sun, C.T. and Mizutani, E., 'Neuro-fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence', Prentice Hall, 2009. 4. K.A.D. Jo ng, 'Evolutionary Computation – A Unified Approach', PHI Learning, 2009. | | |
| REFERENCE BOOKS: | | |
| <ol style="list-style-type: none"> 1. S. Haykin, 'Neural Networks and Learning Machines', Prentice Hall, 2009. 2. S.Rajasekaran, G.A. Vijayalakshmi Pai,"Neural Networks, Fuzzy logic & Genetic Algorithms", PHI, New Delhi 3. Deb, K., 'Optimization for Engineering Design Algorithms and Examples', Prentice Hall of India. 2009. 4. George J. Klir, Ute St. Clair, Bo Yuan, "Fuzzy Set Theory: Foundations and Applications" Prentice Hall, 1997. | | |
| ONLINE RESOURCES | | |
| <ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/106105173/ | | |