II. Computational Intelligence

1. Artificial Intelligence-I CSE_4053
2. Soft Computing Paradigms-II CSE_4054
3. Computer Vision-III CSE_4031
4. Machine Learning-IV CSE_4032

ARTIFICIAL INTELLIGENCE [3 0 0 3] **[Revised Credit System]** **(Effective from the academic year 2022-2023)** **SEMESTER - VII**			
Subject Code	**CSE_4053**	**IA Marks**	**50**
Number of Lecture Hours/Week	**03**	**Exam Marks**	**50**

Total Number of Lecture Hours	36	Exam Hours	03

CREDITS – 03

Course objectives:

The subject aims to provide the student with:

- an introduction to Artificial Intelligence techniques for building intelligent agents.
- an understanding of the basic issues of informed and uninformed searching techniques .
- an introduction to knowledge representation and reasoning techniques models.
- problem solving using expert systems.

Module -1	**Teaching Hours**
INTRODUCTION: What is AI? Some definitions of AI organized into four categories and Turing test, Foundations of Artificial Intelligence, History of Artificial Intelligence, The state of the Art **Text Book 1:** Chapter: 1	**4 Hours**
Module -2	
INTELLIGENT AGENTS: Introduction, How agents should act, mapping from percept sequences to actions, Agents and Environments, the concept of Rationality, The Nature of Environments, Rational Agent, Structure of intelligent agents: Agent programs Simple reflex agents, model-based, goal-based agents, utility-based agents and learning agents, behavior and environment in which a particular agent operates, properties of agents. **Text Book 1:** Chapter: 2	**7 Hours**
Module – 3	
SOLVING PROBLEMS BY SEARCHING Problem Solving and Search Techniques: Defining the problem as a state space Search State space representation, production systems, problem characteristics, production system characteristics, Uninformed Search: Breadth First Search, Depth First Search, Depth-limited search and Iterative deepening DFS, Uniform cost search. Heuristic Search Techniques: Generate and test, Hill Climbing and variants, simulated annealing, genetic algorithm search. Best First Search, A*	**13 Hours**

algorithm, Constraint Satisfaction Problem, Means-End Analysis, Adversarial search: Min-Max search procedure, Alpha – Beta pruning. **Text Book 1:** Chapter**: 3,4 and 5 Text Book 2** Chapter**:2 and 3**	
Module - 4	
LOGICAL AGENTS: Knowledge based agents, The Wumpus World environment, specifying the environment, acting and reasoning in Wumpus world, representing reasoning and logic: Logic, Propositional logic, Propositional Theorem Proving, Agents based on propositional logic **Text Book 1:** Chapter:**7**	**4 Hours**
Module - 5	
USING PREDICATE LOGIC: Representing simple facts in logic, Representing instances and ISA relationship, Compatible functions and predicates. **Text Book 2:** Chapter: 5	**4 Hours**
Module-6	
KNOWLEDGE REPRESENTATION: Ontological Engineering, knowledge representation using predicate calculus, Knowledge engineering process. Forward versus Backward reasoning. **Text Book 1:** Chapter: 12 **Text Book 2:** Chapter: 6	**4 hours**
Course outcomes:	
The student after undergoing this course will be able to: 1. Exhibit strong familiarity with a number of important AI techniques. 2. Interpret the modern view of AI as the study of agents based intelligent systems 3. Build awareness of AI challenges in problem solving 4. Assess AI techniques and apply them to real world problems. 5. Develop self-learning and research skills to tackle a topic of interest	
Text Books: 1. Stuart Russell and Peter Norvig – *Artificial Intelligence A Modern Approach*, Pearson Education, Third Edition, 2016.	

2. Elaine Rich, Kevin Knight,Shivashankar B. Nair, *Artificial Intelligence,* Third Edition, Tata McGraw Hill Edition, 2010

Reference Books:

1. Saroj Kaushik– *Artificial Intelligence*, Cengage Learning Publications, First Edition, 2011.
2. Don W. Patterson - *Introduction to Artificial Intelligence and Expert Systems*, PHI Publication,2006.

SOFT COMPUTING PARADIGMS [3 0 0 3]
[Revised Credit System]
(Effective from the academic year 2022- 23)
SEMESTER – VI

Subject Code	**CSE_4054**	**IA Marks**	**50**
Number of Lecture Hours/Week	**03**	**Exam Marks**	**50**
Total Number of Lecture Hours	**36**	**Exam Hours**	**03**

CREDITS – 03

Course objectives: This course will enable students to

- To Conceptualize the working of human brain using ANN.
- To become familiar with neural networks that can learn from available examples and generalize to form appropriate rules for inference systems.
- To introduce the ideas of fuzzy sets, fuzzy logic and use of heuristics based on human experience.
- To provide the mathematical background for carrying out the optimization and familiarizing genetic algorithm for seeking global optimum in self-learning situation.

Module -1 (ARTIFICIAL NEURAL NETWORKS)	**Teaching Hours**
INTRODUCTION What is a Neural Network? The Human Brain, Models of a Neuron, Neural Networks Viewed As Directed Graphs, Network Architectures, Knowledge Representation Learning Processes, Learning Tasks. (Introduction Chapter of Textbook 1)	**22 Hours**