UEI401 ARTIFICIAL INTELLIGENT TECHNIQUES AND APPLICATIONS

L	T	P	Cr
3	1	2	4.5

Overview of Artificial Intelligence: The concept and importance of AI, Fields related to AI, Human intelligence vs. machine intelligence.

Knowledge and general Concepts: General concept of knowledge, Acquisition, Knowledge Representation and organization: Prepositional and Predicate Logic, Theorem Proving, Structured Knowledge representation using Semantic Networks, Frames, Scripts,, Conceptual Graphs, Conceptual Dependencies, Knowledge Manipulation: Search space control, Uninformed search, Depth first search, Breadth first search, Depth first search with iterative deepening, Heuristic Search :Minimax Search procedure.

Expert Systems: Expert systems: advantages, disadvantages, Expert system architecture, Functions of various parts, Mechanism and role of inference engine, Types of Expert system, Tuning of expert systems, Role of Expert systems in instrumentation and process control.

Artificial Neural Networks: History of neural networks, Structure and function of a single neuron, Biological neurons, Artificial neuron models, Types of activation functions, Neural network architectures: Fully connected, layered, Acyclic, Feed forward, Neural learning: Correlation, Competitive, Evaluation of networks; Supervised learning: Back propagation algorithm, Unsupervised learning, winner–take all networks, Adaptive resonance theory, Application areas of neural networks: Classification, Clustering, Pattern associations, Function approximation, Forecasting.

Fuzzy Logic: Fuzziness vs Probability, Crisp logic vs Fuzzy logic, Fuzzy sets and systems, Operations on sets, Fuzzy relations, Membership functions, Fuzzy rule generation, De–fuzzification, Applications of Fuzzy Logic in process Control and motion control.

Genetic Algorithms: Introduction and concept, Coding, Reproduction, Cross–over and mutation scaling, Fitness, Applications.

Case Studies: Case studies related to AI in Instrumentation systems.

Laboratory Work:
MATLAB tools using Fuzzy logic, ANFIS, Neural Networks, GA.

COURSE LEARNING OUTCOME (CLO): The student will be able to

1. Understand the knowledge and general concepts of artificial intelligence.
2. Understand the concept of Artificial Neural Networks, Learning and Pattern Classification
3. Understand fuzzy logic, genetic algorithms and its applications in control systems

Text Books:
1. *Petterson, D.W., Introduction to Artificial Intelligence and Expert Systems, Prentice Hall of India (2007).*
2. *Zurada, J.M., Introduction to Artificial Neural Network System, Jaico Publication (2006).*
3. *Zurada, J.M., C++ Neural Networks and Fuzzy Logic, BPS Publications (2009).*

Reference Books:
1. *Yegnanarayana, B., Artificial Neural Networks, Prentice –Hall of India Private Limited (2008).*
2. *Winston, P.H., Artificial Intelligence, Addison Wesley (1994).*
3. **Evaluation Scheme:**

Sr. No.	Evaluation Elements	Weightage (%)
1	MST	25
2	EST	35
3	Sessionals (May include Assignments/Projects/Tutorials/Quizzes/Lab Evaluations)	40