

Subject Code	Courses	L	T	P	Hrs.	Credit
<b>ME5EL31</b>	<b>Artificial Intelligence in Technology</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>4</b>

### **Unit 1**

Introduction Definition and Terminologies, Basic concepts of artificial Intelligence, Scope, Role and potential of artificial intelligence in manufacturing, Declarative programming, Production Systems, Heuristics, Problem Characteristics. Search Techniques: Best first, Depth first & Breadth-first search, Branch and Bound, AND/OR graphs, Game Playing, General problem solver, Constraints satisfaction, Planning of tasks. Structured knowledge representation, knowledge representation issues, Predicate logic, Resolution, Representing knowledge using rules, Frame, Scripts, Conceptual dependency and Semantic nets. Application of knowledge based systems in design and manufacturing, Overview of advanced features, planning, learning, natural language processing, neural nets, fuzzy logic, object oriented programs.

### **Unit 2**

**Neural Computing:** Structure and functioning of biological brain and neuron, concept of learning/training. Model of Artificial neuron, Transfer functions, ADALINE, MADALINE, Perceptron: Binary & Continuous inputs, linear separability,

### **Unit 3**

**Perceptions:** Single Layer and Multi Layer Perceptron, Significance, Training using Back Propagation Algorithm & its derivation, Problems with Back Propagation. Hop-field Nets: Architecture, Energy functions, Training algorithms and examples. Application of NN in design, manufacturing and management

### **Unit 4**

**Fuzzy Systems:** Fuzzy Set Theory, Fuzzy complement, Union and Intersection. Fuzzy Logic: AND, OR, NOT operations, De-Morgan's Law, Membership functions, Fuzzy relations, Application of Fuzzy logic: Fuzzy control- selection of membership functions, Fuzzifications, Rule based design & Interfacing, defuzzification, Applications in Manufacturing and design

### **Unit 5**

**Expert Systems:** Overview of Expert systems, Concepts of ES, Characteristics of ES, The Development of ES Technology, Expert System applications and domain .Application of ES in Design, Manufacturing and Management architecture, comparison with procedural programming, developing Expert system for typical manufacturing domains, implementation and maintenance, state-of- art Expert system application, case study Domains welding, casting, forming, metal cutting, maintenance

### **Unit 6**

**Genetic Algorithm:** Robustness of Traditional Optimization and Search methods – Goals of optimization-GA versus Traditional methods, Mathematical foundations: The fundamental theorem - Schema processing at work. The 2-armed and k-armed Bandit problem. The building Block Hypothesis. GA OPERATORS, Data structures Reproduction- Roulette-wheel Selection – Boltzman Selection – Tournament Selection-Rank Selection, Steady state selection, Crossover mutation, A time to reproduce, a time to cross. Get with the Main

program. Mapping objective functions to fitness forum. Fitness scaling. Coding A Multi parameter, Mapped, Fixed point coding Discretization – constraints. Current Applications.

#### TEXT BOOKS

1. David E. Gold Berg, “Genetic Algorithms in Search, Optimization & Machine Learning”, Pearson , 2001
2. S.Rajasekaran, G.A.Vijayalakshmi Pai, “ Neural Networks, Fuzzy Logic and Genetic Algorithms “, PHI ,
3. Kosko B. Neural Networks and Fuzzy Systems –PHI.
4. Aleksander& Morton, An Introduction to Neural Computing
5. Elaine Rich, Kevin Knight- Artificial Intelligence

#### REFERENCE BOOK

- 1 Kalyanmoy Deb, “Optimization for Engineering Design, algorithms and examples”, PHI 1995
- 2 Schalkoff, Artificial Intelligence: An Engineers Approach, McGraw Hill
- 5 Yoh-Han Pao Adaptive Pattern Recognition and Neural Networks Addison-Wesley