

**FOUNDATIONS OF ARTIFICIAL INTELLIGENCE (Minors)**

**Course Objectives:**

1. To learn about the Artificial Intelligence and Problem solving
2. To gain knowledge of the logic concepts in AI
3. To learn about the knowledge representation and expert systems
4. To assimilate about fuzzy logic

**Course Outcomes:**

Upon the completion of the course the student will learn

1. To be able understand Artificial Intelligence and problem-solving strategies
2. To use different logic concepts in AI
3. To analyze various knowledge representation approaches
4. To build expert systems
5. To understand fuzzy sets and fuzzy logic

**UNIT I**

**Introduction to Artificial Intelligence:** Introduction, History, Intelligent Systems, Foundations of AI, Applications, Tic-Tac toe game playing, development of AI languages, Current trends in AI.

**Problem Solving:** State-Space Search and Control Strategies: Introduction, General Problem Solving, Characteristics of Problem, Exhaustive searches, heuristic search techniques, iterative deepening a\*, Constraint Satisfaction

**UNIT II**

**Problem Reduction and Game Playing:** Introduction, problem reduction, game playing, alpha-beta pruning, two-player perfect information games.

**Logic Concepts:** Introduction, propositional calculus, propositional logic, natural deduction system, axiomatic system, semantic tableau system in propositional logic, resolution refutation in propositional logic, predicate logic

**UNIT III**

**Knowledge Representation:** Introduction, Approaches to Knowledge representation, Knowledge representation using Semantic Network, Extended Semantic Network for KR, Knowledge representation using Frames Advance Knowledge Representation Techniques: Introduction, Conceptual Dependency Theory, Script Structure, CYC Theory, Case Grammars, Semantic WeB.

**UNIT IV**

**Expert Systems:** Expert Systems, Phases in building expert systems, Expert System Architecture, Rule-Based Systems, Forward Chaining, Blackboard Systems, Blackboard architecture, Blackboard System vs Rule based system, Truth maintenance system.

## **UNIT V**

**Uncertainty measure & Fuzzy sets and fuzzy logic:** Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, Dempster-Shafer theory Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

### **Text Books:**

1. Artificial Intelligence by Elaine Rich, Kevin Knight and Shiva Shankar B Nair, Tata McGraw Hill.
2. Introduction to Artificial Intelligence and Expert Systems by Dan W. Patterson, Pearson Education.

### **Reference Books:**

1. Artificial Intelligence: A Modern Approach by S. Russell and P. Norvig, Prentice Hall