

<b>Devi Ahilya University, Indore, India Institute of Engineering &amp; Technology</b>				<b>III Year B.E. (Electronics and Telecommunication)</b>			
<b>Subject Code &amp; Name</b>	<b>Instructions Hours per Week</b>			<b>Credits</b>			
<b>ETR5E4 ARTIFICIAL INTELLIGENCE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
<b>Duration of Theory Paper: 3 Hours</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>5</b>

**Learning Objective:** To search and discover intelligent characteristics of existing AI projects, map a new problem – as search and create an animation – showing different search strategies for a problem, program a new game/ problem in Prolog, evaluate different Knowledge Representation schemes for typical AI problems, design and implement a typical AI problem to be solved Using Machine Learning Techniques, design and implement a futuristic AI application

**Prerequisite:** Basic Mathematics and Programming

## **COURSE CONTENTS**

### **UNIT I INTRODUCTION**

Introduction, Definition, Future of Artificial Intelligence, Characteristics of Intelligent Agents , Typical Intelligent Agents, Problem Solving Approach to Typical AI problems

### **UNIT II PROBLEM SOLVING METHODS**

Problem solving Methods, Search Strategies, Uninformed, Informed, Heuristics, Local Search Algorithms and Optimization Problems, Searching with Partial Observations, Constraint satisfaction Problems, Constraint Propagation, Backtracking Search, Game Playing , Optimal Decisions in Games ,Alpha, Beta Pruning, Stochastic Games

### **UNIT III KNOWLEDGE REPRESENTATION**

First Order Predicate Logic, Prolog Programming, Unification, Forward Chaining, Backward Chaining, Resolution, Knowledge Representation, Ontological Engineering, Categories and Objects, Events, Mental Events and Mental Objects, Reasoning Systems for Categories, Reasoning with Default Information

### **UNIT IV MACHINE LEARNING**

Probability basics, Bayes Rule and its Applications, Bayesian Networks, Exact and Approximate Inference in Bayesian Networks, Hidden Markov Models, Forms of Learning , Supervised Learning, Learning Decision Trees, Regression and Classification with Linear Models, Artificial

Neural Networks, Nonparametric Models, Support Vector Machines, Statistical Learning, Learning with Complete Data, Learning with Hidden Variables, the EM Algorithm, Reinforcement Learning

#### **UNIT IV INTRODUCTION TO PROLOG**

Introduction To Prolog: Syntax and Numeric Function, Basic List Manipulation Functions In Prolog, Functions, Predicates and Conditional, Input, Output and Local Variables, Iteration and Recursion, Property Lists and Arrays, Miscellaneous Topics, LISP and Other AI Programming Languages.

#### **Learning Outcome:**

After learning the course the students should be able to

- Understand various search methods
- Use various knowledge representation methods
- Understand various Game Playing techniques
- Use Prolog Programming language using predicate logic

#### **BOOKS RECOMMENDED:**

- [1].S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach , Prentice Hall, 3 rd Edition, 2009
- [2]. Bratko, I., Prolog Programming for Artificial Intelligence (International Computer Science Series), Addison-Wesley Educational Publishers Inc; 4th edition, 2011.
- [3].David L. Poole, Alan K. Mackworth , Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press, 2010.
- [4].Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning series), The MIT Press; second edition, 2009
- [5]. William F. Clocksin, and Christopher S. Mellish, "Programming in Prolog: Using the ISO Standard, Fifth Edition, Springer, 2003

#### **List of Practical Assignments:**

1. Write a program to implement Tic-Tac-Toe game problem.
2. Write a program to implement BFS (for 8 puzzle problem or Water Jug problem or any AI search problem) .
3. Write a program to implement DFS (for 8 puzzle problem or Water Jug problem or any AI search problem)
4. Write a program to implement Single Player Game (Using Heuristic Function)
5. Write a program to Implement A\* Algorithm.
6. Write a program to solve N-Queens problem using Prolog.
7. Write a program to solve 8 puzzle problem using Prolog.
8. Write a program to solve travelling salesman problem using Prolog.
9. Write the Conceptual Dependency for following statements.
  - (a) John gives Mary a book
  - (b) John gave Mary the book yesterday