

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Information Technology (Full Time))			
Subject Code & Name	Instructions Hours per Week			Credits			
	L	T	P	L	T	P	Total
ITR7G5 Artificial Intelligence	3	1	0	3	1	0	4
Duration of Theory Paper: 3 Hours							

### Learning Objectives:

- Study the concepts of Artificial Intelligence.
- Learn the methods of solving problems using Artificial Intelligence.
- Learn the knowledge representation techniques, reasoning techniques and planning
- Introduce the concepts of Expert Systems and machine learning.

### Pre requisites:

Data Structures and Algorithms Analysis of Algorithm

## COURSE CONTENTS

### UNIT-I

**Introduction:** Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics Problem solving methods – Defining the problem as state space search, Problem graphs, Matching, Indexing and Heuristic functions.

### UNIT-II

**Search Techniques:** Hill Climbing-Depth first and Breath first, heuristic search strategies-Best-first search, A\*, AO\* search, Constraints satisfaction, Means end analysis, simulated annealing, etc. Measure of performance and analysis of search algorithms. Adversarial search –Minimax search procedure, alpha-beta pruning, iterative deepening, genetic algorithms - Related algorithms, etc.

### UNIT-III

**Representation of Knowledge :** Game playing - Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge. Knowledge representation -Production based system, Frame based system, Scripts, CD, Ontologies, Sementic web and RDF.

### UNIT-IV

**Knowledge Inference and Planning:** Inference – Backward chaining, forward chaining, Rule value approach, uncertain knowledge and reasoning: Probabilistic reasoning, Bayesian networks, Fuzzy logic and reasoning, Theory-Bayesian Network-Dempster - Shafer theory. Planning overview, components of planning system, Goal stack planning, Hierarchal planning, and other planning techniques.

## **UNIT-V**

**Machine Learning and Expert Systems:** Overview of different forms of learning, Statistical methods, Learning Decision Trees, Neural Networks, Clustering- basic agglomerative, divisive algorithm based on similarity/dissimilarity measures. Introduction to Natural Language Processing.

Architecture of expert systems, Roles of expert systems - Knowledge Acquisition –Meta knowledge. Typical expert systems - MYCIN, DART, XOON, Expert systems shells. Basic knowledge of Prolog programming language.

### **Learning Outcomes:**

Upon completing the course, students will be able to:

- Familiar with Artificial Intelligence, its foundation and principles.
- Identify appropriate AI methods to solve a given problem.
- Examine the useful search techniques, knowledge representation techniques, Inference methods; learn their advantages, disadvantages and comparison.
- Understand important concepts like Expert Systems, AI applications.
- Learn Prolog Programming to program intelligent systems.

### **BOOKS RECOMMENDED:**

[1] Kevin Night and Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, Mc Graw Hill-2008.

[2] Stuart Russel and Peter Norvig “AI – A Modern Approach”, 2nd Edition, Pearson Education 2007 Peter Jackson, “Introduction to Expert Systems”, 3 rd Edition, Pearson Education, 2007.

[3] Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007. (Unit-III).

[4] <http://nptel.ac.in>.

[5] Carl Townsend, “Introduction to Turbo PROLOG”, BPB Publication.

[6] Ivan Bratko, ”Prolog Programming for Artificial Intelligence”, 3<sup>rd</sup> Edition, Pearson Education.

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