

Devi Ahilya University, Indore, India Institute of Engineering & Technology				IV Year B.E. (Computer Engineering) (Full Time)			
Subject Code & Name	Instructions Hours per Week			Credits			
CER7C3	<b>L</b>	<b>T</b>	<b>P</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
<b>Artificial Intelligence</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>5</b>
<b>Duration of Theory Paper:3 Hours</b>							

### 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

#### 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 Breadth 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, Semantic 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, Hierarchical 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, XCON, 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<sup>rd</sup> 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.