

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			
7CERC3	L	T	P	L	T	P	Total
Artificial Intelligence	3	1	2	3	1	1	5
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

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, 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 technique

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, XOOM, Expert systems shells. Basic knowledge of Prolog programming language.

Course Objective

Upon completing the course, students will be able to:

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

Course Outcome:

Students earned credits will develop ability to

CO.No.	CO	PO
CO1	Explain the fundamental concepts of Artificial Intelligence, including problem formulation, production systems, and heuristic search strategies.	PO1, PO2, PO5
CO2	Apply various search techniques (such as A*, AO*, and genetic algorithms) to solve complex problems and evaluate their performance.	PO1, PO2, PO3, PO4, PO5,
CO3	Demonstrate knowledge representation using logical and structured approaches, including predicate logic, frames, scripts, and ontologies.	PO1, PO2, PO4, PO5
CO4	Analyze and implement reasoning and planning methods such as probabilistic reasoning, Bayesian networks, and fuzzy logic for intelligent decision-making.	PO1, PO2, PO3, PO4, PO5
CO5	Illustrate different machine learning methods and expert system architectures, and apply basic Prolog programming to represent and infer knowledge.	PO1, PO2, PO3, PO4, PO5,

CO PO Relationship

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	2	2						
CO2	3	3	2	3	3						2
CO3	3	2	2	2	3						
CO4	3	3	2	3	3						
CO5	3	3	2	2	3						

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 2007Peter 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”, 3rd Edition, Pearson Education.