Artificial Intelligence(404190)

Teaching Scheme:
Lectures: 3Hrs/ Week

Examination Scheme:
In Semester Assessment:
Phase I : 30
End Semester Examination:
Phase II: 70

Course Objectives:

- To learn various types of algorithms useful in Artificial Intelligence (AI).
- To convey the ideas in AI research and programming language related to emerging technology.
- To understand the concepts of machine learning, probabilistic reasoning, robotics, computer vision, and natural language processing.
- To understand the numerous applications and huge possibilities in the field of AI that go beyond the normal human imagination.

Course Outcomes:

After successfully completing the course students will be able to

- Design and implement key components of intelligent agents and expert systems.
- To apply knowledge representation techniques and problem solving strategies to common AI applications.
- Apply and integrate various artificial intelligence techniques in intelligent system development as well as understand the importance of maintaining intelligent systems.
- Build rule-based and other knowledge-intensive problem solvers.

Unit I : Foundation 6L

Intelligent Agents, Agents and environments, Good behavior, The nature of environments, structure of agents, Problem Solving, problem solving agents, example problems, Searching for solutions, uniformed search strategies, avoiding repeated states, searching with partial information.

Unit II : Searching 7L

Search and exploration, Informed search strategies, heuristic function, local search algorithms and optimistic problems, local search in continuous spaces, online search agents and unknown environments, Constraint satisfaction problems (CSP), Backtracking search and Local search for CSP, Structure of problems, Games: Optimal decisions in games, Alpha- Beta Pruning, imperfect real-time decision, games that include an element of chance.

Unit III : Knowledge Representation 6L

First order logic, representation revisited, Syntax and semantics for first order logic, Using first order logic, Knowledge engineering in first order logic, Inference in First order logic, prepositional versus first order logic, unification and lifting, forward chaining, backward chaining, Resolution, Knowledge representation, Ontological Engineering, Categories and objects, Actions - Simulation and events, Mental events and mental objects.

Unit IV : Learning 6L

Learning from observations: forms of learning, Inductive learning, Learning decision trees, Ensemble learning, Knowledge in learning, Logical formulation of learning, Explanation based learning, Learning using relevant information, Inductive logic programming, Statistical learning methods, Learning with complete data, Learning with hidden variable, EM algorithm, Instance based learning, Neural networks - Reinforcement learning, Passive reinforcement learning, Active reinforcement learning, Generalization in reinforcement learning.

Unit V : Perception and Expert System 5L

Visual perception-Waltz's algorithm, Introduction to Expert System, Architecture and functionality, Example Expert system

Unit VI : Natural Language Understanding 6L

Why NL, Formal grammar for a fragment of English, Syntactic analysis, Augmented grammars, Semantic interpretation, Ambiguity and disambiguation, Discourse understanding, Grammar induction, Probabilistic language processing, Probabilistic language models

Text Books

1. Stuart Russell, Peter Norvig, "Artificial Intelligence", A Modern Approach, Pearson Education/Prentice Hall of India.
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw-Hill.

Reference Books

1. Nils J. Nilsson, "Artificial Intelligence: A new Synthesis", Harcourt Asia Pvt. Ltd.
2. George F. Luger, "Artificial Intelligence-Structures and Strategies for Complex Problem Solving", Pearson Education/ PHI.