19CS313 ARTIFICIAL INTELLIGENCE

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P	CS	WA/RA	SSH	SA	S	BS
45	-	30	5	5	30	20	5	5

PREREQUISITE COURSES: Programming for Problem Solviing, Data Structures, Design & Analysis of Algorithms, Discrete Mathematics, Probability and Statistics.

COURSE DESCRIPTION AND OBJECTIVES:

The primary objective of this course is to introduce the basic principles, techniques, and applications of Artificial Intelligence. In addition to this, student will understand the building blocks of AI such as search, knowledge representation, inference, logic and learning. This course enables the students to develop a small AI system for real time problems.

COURSE OUTCOMES:

Upon completion of the course, the student will be able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Apply AI search Models and Generic Search strategies for problem solving.	1
2	Inspect and analyze Logic for representing Knowledge and Reasoning of AI systems.	2
3	Apply and evaluate the searching strategies to achieve the goalfor a given situation.	3
4	Design different learning algorithms for improving the performance of AI systems.	4
5	Conduct investigation and implement project using AI learning techniques.	5

SKILLS:

✓   *Analyze Intelligent systems.*

✓   *Apply problem solving techniques.*

✓   *Interface various knowledge representation.*

✓   *Create a dynamic planning.*

UNIT– I   **L- 5**

INTELLIGENT SYSTEMS: What is AI; The foundations for AI; The history of AI; The state of the art; Intelligent Agents agents and environments, the concept of rationality, the nature of environments, the structure of agents.

UNIT – II   **L- 12**

PROBLEM SOLVING: Solving problems by searching-problem solving agents, searching for solutions; Uninformed Search Strategies-BFS, DFS, UCS, IDS, BS; Informed Search Strategies-best first search, greedy search, A*, AO* algorithms, hill climbing; Adversarial Search-games, optimal decisions in games, alpha beta pruning.

UNIT – III   **L- 12**

KNOWLEDGE REPRESENTATION: Logical Agents- knowledge based agents, the wumpus world, logic, propositional logic, propositional theorem proving, agents based on propositional logic; First-order logic-representation- revisited, syntax and semantics, knowledge engineering in first order logic; Inference in FOL-propositional vs FOL, unification and lifting, forward chaining, backward chaining, resolution.

UNIT – IV   **L- 6**

PLANNING: The Planning problem- planning with state space search; Partial order planning; Planning graphs; Planning with propositional logic; Analysis with planning approaches.

UNIT – V   **L- 10**

LEARNING: Forms of learning- supervised learning, unsupervised learning, reinforcement learning, ensemble learning, learning decision trees; Artificial Neural networks; Expert Systems; Machine Learning; Natural language processing.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS   **TOTAL HOURS: 30**

1.   Write a PROLOG program to implement Vacuum Cleaner Agent.

2.   Write a PROLOG program to implement BFS, DFS.

3.   Writea PROLOG program to implement 8-Puzzle problem using A* algorithm.

4.   Write a PROLOGprogram to implement n queens problem.

5.   Write a PROLOG program to implement MIN-MAX algorithm.

6.   Write a PROLOG program to represent simple fact for a statement.

7.   Write a PROLOG program to represent a graph and apply BFS on it.

8.   Write a PROLOG program for backward and forward reasoning.

9.   Write a PROLOG program containing facts related to following predicates

     Location (city, state)

     Stays (person, city)

     Display: (i) list of persons, state and city (ii) Given person, find the state in which he is staying.

10. Write a PROLOG program that answers about family members and relationships. Include predicates & clauses which define sister, brother, father, mother, Grandchild, grandfather and uncle. The program should be able to answer question such as following.

     a.   Father (X, bob)

     b.   Grandson (X, Y)

     c.   Uncle (bill, Sue)

     d.   Mother (marry, X)

11. write a PROLOG program to implement an inductive learning algorithm for decision trees.

TEXT BOOKS:

1.   Stewart Russell and Peter Norvig, "Artificial Intelligence-A Modern Approach", 3rd edition, Pearson Education/ Prentice Hall, 2010.

2.   Ivan Bratko, "Prolog Programming for Artificial Intelligence", 4th edition, Addison Wesley, 2011.

3.   Saroj Kaushik, "Logic And Prolog Programming", 1ST edition, New Age International Publishers, 2002.

REFERENCE BOOKS:

1.   Elaine Rich, Kevin Knight and Shivashankar B Nair, "Artificial Intelligence" 3rd edition, Tata MCGraw, 2013.

2.   George F Luger, "Artificial Intelligence"5th edition, Pearson Education, 2009.

3.   Dan W Patternson, "Introduction to Artificial Intelligence and Expert systems", 2nd edition, PHI learning, 2005.