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***CS5402 Artificial Intelligence***

**L-T-P-Cr: 3-0-0-3**

**Pre-requisites:** None

**Objectives/Overview:**

* To introduce an overview of artificial intelligence (AI) principles and approaches
* To develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents: Search, Knowledge representation, inference, logic, and learning.
* To introduce the concepts of decision-making theories.
* To introduce the role of machine learning in AI.

**Course Outcomes:**

At the end of the course, a student should come to know:

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| **Sl. No** | **Outcome** | **Mapping to PO** |
|  1 | Knowledge based system designing | PO1, PO2, PO4 |
|  | The different planning strategies | PO4 |
|  | Uncertain knowledge and decision making | PO1, PO2 |

**UNIT I: Intelligent agents Lectures: 5**

reactive, deliberative, goal-driven, utility-driven, and learning agents. Artificial Intelligence programming techniques.

**UNIT II:** **Problem-solving through Search Lectures: 5**

forward and backward, state-space, blind, heuristic, problem-reduction, A, A\*, AO\*, minimax, constraint propagation, neural, stochastic, and evolutionary search algorithms, sample applications.

**UNIT III: Knowledge Representation and Reasoning Lectures: 7**

ontologies, foundations of knowledge representation and reasoning, representing and reasoning about objects, relations, events, actions, time, and space; predicate logic, situation calculus, description logics, reasoning with defaults, reasoning about knowledge, sample applications

**UNIT IV: Planning**  **Lectures: 4**

planning as search, partial order planning, construction and use of planning graphs

**UNIT V:** **Representing and Reasoning with Uncertain Knowledge Lectures: 5**

probability, connection to logic, independence, Bayes rule, Bayesian networks, probabilistic inference, sample applications.

**UNIT VI:** **Decision-Making Lectures: 5**

basics of utility theory, decision theory, sequential decision problems, elementary game theory, sample applications.

**UNIT VII:** **Machine Learning and Knowledge Acquisition Lectures: 10**

learning from memorization, examples, explanation, and exploration learning nearest neighbour, naive Bayes, and decision tree classifiers, Q-learning for learning action policies, applications. Sample Applications of AI, student project presentations.

**UNIT VIII:** **Brief Survey of selected additional topics Lectures: 3**

perception, communication, interaction, and action; multi-agent systems.

**Text/Reference Book:**

1. *Artificial intelligence and intelligent systems* by N. P. Padhy, Published 2005 by Oxford University Press, Tom Mitchell, McGraw Hill, 1997
2. *Artificial Intelligence: A Modern Approach*, 3rd Edition, by Stuart Russell and Peter Norvig.
3. *Machine Learning*, Tom Mitchell, McGraw Hill, 1997.