2/3 MCA Second Semester

CA4T3   **ARTIFICIAL INTELLIGENCE**   **Credits : 4**

Lecture Hours : 4 periods / week   Internal assessment : 30   Marks

Semester and Examination: 70   Marks

Course Description:

The course is a basic prerequisite for software engineers which introduces basic concepts of AI. It will introduce the basic principles in artificial intelligence research. It will cover simple representation schemes, problem solving paradigms, constraint propagation, and search strategies. Areas of application such as knowledge representation, natural language processing, expert systems, vision and robotics will be explored.

Course Objective:
• To introduce you to some of the basic theory and practical techniques in artificial intelligence.
• To have an appreciation for and understanding of both the achievements of AI and the theory underlying those achievements.
• To have an appreciation for the engineering issues underlying the design of AI systems.
• To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
• To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
• To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning.

Unit –I:
Artificial Intelligence: Introduction, Intelligence, AI- History and Applications, Turing Test , Application areas, Problem Space, Problem Characteristics, AI Problems.

Unit-II:
Search Strategies: Introduction, State Space, State Space Search, Strategies for State Space S earch, Search Strategies: Brute Force Techniques- Breadth first Search(BFS), Depth First Search(DFS), DFS with Iterative Deepening, Examples.

Unit – III:
Heuristic Search: Introduction, Searching as problem Solving Technique, Heuristic Search, Techniques-Hill Climbing, Best First Search, Admissibility, Monotonicity and informedness, A* Algorithm, Problem reduction, Constraint Satisfaction. Adversarial Search**:** Introduction, Game Playing, Min-Max Principle, Alpha Beta Procedure.

UNIT – IV:
Knowledge Representation: Issues in Knowledge Representation, History, propositional Calculus, Predicate calculus, Inference Rules, Clause Form, Unification, Resolution, Forward Chaining Vs Backward Chaining.

UNIT –V:
Reasoning with Uncertainty: Introduction, Non-Monotonic Reasoning, Truth Maintenance Systems, Sources of Uncertainty, Bayesian Reasoning, Belief Networks, Dempster – Shaper Theory, Fuzzy Logic.

UNIT – VI:
Semantic Nets: Introduction, Semantic Nets, Weak and Strong Semantic Nets, Conceptual Graphs, Frames, Scripts, Conceptual Dependencies, CYC Examples.

UNIT – VII:

Planning: Introduction, Example, Components of a Planning System, Goal Stack Planning, Hierarchical Planning.

UNIT VIII:

Natural Language Processing: Introduction, Role of Knowledge in Language Understanding, Syntax Analysis, Semantic Analysis, Natural Language Applications.

Learning Resources

Text Books:

1. Artificial Intelligence – Structures and Strategies for Complex Problem Solving, George F. Luger, Pearson Education, 4/e, 2003.
2. Artificial Intelligence and Intelligent Systems, N. P. Padhy, Oxford Press, 4/e, 2008.
3. Artificial Intelligence , 2nd Edition, Elaine Rich, Kevin Knight and Sivasankar B. Nair, Tata McGraw-Hill,3/e,2004.

Reference Books:

1. Artificial Intelligence – A Modern Approach. Second Edition, Stuart Russel, Peter Norvig, PHI/ Pearson Education, 2010.
2. Artificial Intelligence: A new Synhesis Approach, Nils J. Nilson, Morgan Kaufmann, 1998