MCAH301: ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Hours/Week: 4 I.A. Marks: 30

Credits: 4 Exam. Marks: 70

Course Learning Objectives: Students will able to try,

1. The basic exposition to the goals and methods of Artificial Intelligence.
2. The student to apply these techniques in applications which involve perception, reasoning and learning.
3. To have an understanding of the basic issues of knowledge representation and blind and heuristic search.
4. The basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning.

Course Outcomes: After completing the course, the students will be able to,

CO1: Recognize concept of knowledge representation and predicate logic and transform the real life information in different representation.

CO2: Realize the state space and its searching strategies.

CO3: Understand machine learning concepts and range of problems that can be handled by machine learning.

CO4: Apply the machine learning concepts in real life problems.

C05: compare AI with human intelligence and traditional information processing and discuss its strengths and limitations as well as its application to complex and human-centred problems.

C06: Discuss the core concepts and algorithms of advanced AI, including informed searching Algorithm, Different Types of Machine Learning Approaches

C07: Apply the basic principles, models, and algorithms of AI to recognize, model, and solve problems in the analysis and design of information systems.

UNIT-I 12 Hrs.

Introduction - Overview of AI applications. Introduction to representation and search. The Propositional calculus, Predicate Calculus, Using Inference Rules to produce Predicate Calculus expressions, Application – A Logic based financial advisor.

UNIT-II 12 Hrs.

Introduction to structure and Strategies for State Space search, Graph theory, Strategies for state space search, Using the State Space to Represent Reasoning with the Predicate calculus (Sate space description of a logical system, AND/OR Graph). Heuristic Search: Introduction, Hill-Climbing and Dynamic Programming, The Best-first Search Algorithm, Admissibility, Monotonicity and informed ness, Using Heuristics in Games.

UNIT-III 12 Hrs.

Introduction to Machine Learning: Concept of Learning Task, Inductive Learning and The Concepts Of Hypothesis Space, Introduction To Different Types Of Machine Learning Approaches, Examples of Machine Learning Applications, Different Types of Learning; Supervised Learning, Unsupervised Learning, Reinforcement Learning. Training, Validation and Testing, Over-Fitting and Under-Fitting, Different Types of Error Calculation.

UNIT-IV 12 Hrs.

Supervised Learning: Introduction, Learning A Class From Example, Learning Multiple Classes, Model Selection and Generalization, Linear Regression and Feature Selection, Bayesian and

Decision Tree Learning; Classification Tree and Regression Tree, Multivariate Methods for Learning; Multivariate Classification and Regression. Unsupervised Learning: Introduction, Clustering; Mixture Densities, K-Means Clustering, Expectation Maximization Algorithm, Mixture Latent Variable Models, Latent Dirichlet Allocation, Spectral and Hierarchical Clustering, Dimensionality Reduction; Principal Component Allocation, Linear Discriminant Analysis, Canonical Correlation Analysis.

REFERENCE BOOKS:

1. George F Luger, Artificial Intelligence – Structures and Strategies for Complex problem solving, 5thEdn, pearson.
2. E. Rich, K. Knight, S B Nair, Artificial intelligence, 3rdEdn, McGraw Hill.
3. S. Russel and P. Norvig, Artificial intelligence – A Modern Approach, 3rdEdn, Pearson
4. D W Patterson, Introduction to Artificial Intelligence and Expert Systems, PHI, 1990.
5. Ethem Alpaydin, Introduction to Machine Learning- 3rd Edition, PHI.
6. Tom M. Mitchell, Machine Learning, McGraw-Hill.
7. Ian Goodfellow and Yoshua Bengio and Aaron Courville, Deep Learning (Adaptive Computation and Machine Learning), MIT Press, 2016.