

**Course: Elective
Advanced Artificial Intelligence**

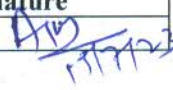
Semester: I	Credits:4	Subject Code:SMAJEAAI123556	Lectures: 60
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Course Outcomes:

At the end of this course, the learner will be able to:

- CO1- Understand the informed and uninformed problem types and apply search strategies to solve them.
- CO2- Differentiate between biological neuron, artificial neuron, the application areas of neural networks, and building blocks of Neural Networks
- CO3-Apply difficult real-life problems in a state space representation to solve them using AI techniques like searching and game playing
- CO4- Formulate valid solutions for problems involving uncertain inputs or outcomes by using decision making techniques
- CO5- Categorize the machine learning algorithms as supervised learning and unsupervised learning and apply and analyze the various algorithms of supervised and unsupervised learning
- CO6-Demonstrate and enrich knowledge to select and apply AI tools to synthesize information and develop models within constraints of application area.

Unit 1:Introduction to Artificial Intelligence and searching algorithm	15
<ul style="list-style-type: none"> • Introduction to Artificial Intelligence-Introduction and Intelligent systems, What Is AI?,The Foundations of Artificial Intelligence , The History of Artificial Intelligence, Applications of AI, Early work in AI and related fields, AI problems and Techniques. • Searching-Defining AI problems as a State Space Search(Search and Control Strategies, Problem Characteristics,Issues in Design of Search Programs, Production System),Blind Search Techniques-(BFS, DFS, DLS, Iterative Deepening Search, Bidirectional Search, Uninformed cost Search),Heuristic search techniques: Generate and test ,Hill Climbing,Best First search ,Constraint Satisfaction ,Mean-End Analysis,A*,AO* 	
Unit 2:Knowledge Representation	15
<ul style="list-style-type: none"> • Knowledge Representation-Representations and Mappings, Approaches to Knowledge Representation, Knowledge representation method,Propositional Logic, Predicate logic, Representing Simple facts in Logic, Resolution,Forward and backward chaining • Knowledge Representation Structure-Weak Structures, Strong Structures, Semantic Networks, Frames, Conceptual Dependencies, Scripts. 	
Unit 3: Game playing and machine learning	15
<ul style="list-style-type: none"> • Game Playing-Minimax Search Procedures, Adding alpha-beta cutoffs, • Machine Learning-Why Machine learning,Types of Machine Learning: Supervised learning- Classification & Regression-Decision tree,Random Forest,KNN, Logistic 	



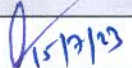
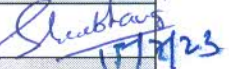
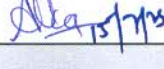
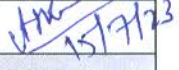

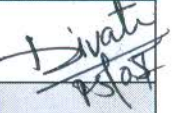
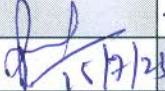
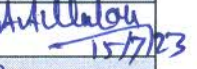
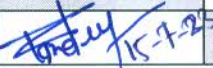
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algorithms, Unsupervised learning-Clustering & Association-K-means for clustering , Apriori algorithm. Support Vector Machine (SVM), Reinforcement learning.

Unit 4: Artificial Neural Networks	15
<ul style="list-style-type: none"> • Artificial Neural Networks (ANN) • Biological neuron structure and functions • Structure and functions of Artificial Neuron. • Difference between biological and Artificial Neural Network • Artificial neural network terminologies • The basic building blocks of Artificial Neural Network- • Network Topology - Feed forward Network, Single layer feed forward network, Multilayer feed forward network • Feedback Network-Recurrent networks, recurrent network, Jordan network • Adjustments of Weights or Learning-Supervised Learning, Unsupervised Learning, Reinforcement Learning • Activation Functions-Binary sigmoidal function, Bipolar, sigmoidal function • Applications of ANN, Advantages and Limitation • Self-Organising Systems-Unsupervised Learning, Kohonen's self-organizing map • Feedback neural networks-Hopfield model, Boltzmann machine 	

Reference Books:
<ul style="list-style-type: none"> • Eberhart, <i>Computational Intelligence</i>, Elsevier Publication • Ethem Alpaydin, <i>Introduction to Machine Learning</i>, PHI 2nd Edition • Nilsson, <i>Artificial Intelligence: A New Synthesis</i>, Elsevier Publication • Prateek Joshi, <i>Artificial Intelligence with Python</i>, Packt Publishing Ltd • Satish Kumar, <i>Neural Networks – A Classroom Approach</i>, Tata McGraw-Hill

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