Course: BTech **Semester:** 5

Prerequisite: Data structure, Formal Languages and automata Theory, Mathematics

Course Objective: This course provides a broad introduction to Artificial Intelligence. AI techniques for search and knowledge representation also Apply knowledge of AI planning and machine learning techniques to real-world problems.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
3	0	0	0	3	20	20	-	60	-	100

SEE - Semester End Examination, **T** - Theory, **P** - Practical

Course Content

W - Weightage (%) , **T** - Teaching hours

Sr.	Topics	W	T
1	**Introduction:** Definition of an AI, Major Areas of Artificial Intelligence, AI Techniques, History, AI problems, Production Systems, Problem characteristics, Intelligent Agents, Agent Architecture, AI Application (E-Commerce, & Medicine), AI Representation, Properties of internal representation, Future scope of AI, Issues in the design of search algorithms. Introduction to AI Problems and Applications, Defining Problems as a State Space Search, Problem Characteristics, Production Systems.	15	7
2	**Search techniques:** Generate-And-Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means-Ends Analysis. Heuristic search, Hill Climbing, Best first search, mean and end analysis, Constraint Satisfaction, A* and AO* Algorithm, Knowledge Representation: Basic concepts, Knowledge representation Paradigms, Propositional Logic, Inference Rules in Propositional Logic, Knowledge representation using Predicate logic, Predicate Calculus, Predicate and arguments, ISA hierarchy, Frame notation, Resolution, Natural Deduction	20	8
3	**Knowledge Representation:** Knowledge Representation – Representation and Mappings, Different Approaches, Issues in knowledge representation. Predicate Logic - Representation Simple Facts in Logic, Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution. Propositional Logic: Representation, Inference, Reasoning Patterns, Resolution, First-order Logic: Representation, Inference, Reasoning Patterns, Resolution	15	8
4	**Uncertainty:** Non-Monotonic Reasoning, Logics for Non-Monotonic Reasoning, Forward rules, and Backward rules, Justification based Truth Maintenance Systems, Semantic Nets Statistical Reasoning, Probability and Bayes' theorem, Bayesian Network, Markov Networks, Hidden Markov Model, Basis of Utility Theory, Utility Functions.	15	4
5	**Fuzzy Sets and Fuzzy Logic:** Fuzzy Set Operations, Membership Functions, Fuzzy Logic, Hedges, Fuzzy Proposition and Inference Rules, Fuzzy Systems.	10	5
6	**Natural Language Processing:** Introduction, Syntactic Processing, Semantic Analysis, Semantic Analysis, Discourse and Pragmatic Processing, Spell Checking.	10	5
7	**Neural Networks and Expert systems:** Introduction to neural networks and perception-qualitative Analysis, Neural net architecture and applications, Utilization and functionality, the architecture of the expert system, knowledge representation, two case studies on expert systems	15	8

Reference Books

1.	**Artificial Intelligence: A New Synthesis, Harcourt Publishers (TextBook)** By N. J. Nilsson | Harcourt Publishers
2.	**Artificial Intelligence (TextBook)** By Elaine Rich and Kevin Knight | TMH
3.	**Artificial Intelligence-Structures and Strategies For Complex Problem Solving** By George F. Luger | Pearson Education / PHI
4.	**Artificial Intelligence-A Modern Approach** By Stewart Russell and Peter Norvig | Pearson Education/ Prentice Hall of India | 2
5.	**Artificial Intelligence – A Practical Approach** By Patterson | Tata McGraw Hill | 3

Course Outcome

After Learning the Course the students shall be able to:

1. Discuss AI fundamentals, history, and future trends to develop solutions for problem-solving, inference, perception, knowledge representation, and learning tasks.
2. Utilize knowledge representation methods like propositional logic, predicate logic, and frame notation to effectively represent knowledge within AI systems.
3. Discover methods for solving AI problems, including diverse search algorithms and techniques like non-monotonic reasoning, probability theory, Bayesian networks, and fuzzy logic for effective decision-making in uncertain scenarios.
4. Apply Natural Language Processing (NLP), Neural Networks and Expert Systems technologies effectively in real-world scenarios.

Miscellaneous

Exam Requirement

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.