CP458: ARTIFICIAL INTELLIGENCE
CREDITS = 5 (L=3, T=0, P=2)

Course objective:

To introduce basic principles, techniques and applications of artificial intelligence

Teaching and Assessment Scheme:

Teaching Scheme			Credits	Marks Distribution				Total Marks
				Theory		Practical		
L	T	P	C	ESE	CE	ESE	CE	
3	0	2	5	70	30	30	20	150

Course Contents:

Sr. No.	Topic	Teaching Hours
1	**Introduction:**	
	Introduction to the domain of Artificial Intelligence (AI) and different sub-domains under the umbrella of AI, AI problems and AI techniques, defining a problem as a problem of 'state space search'.	03
2	**Search Techniques:**	
	Uninformed and heuristic searches, breadth first search, depth first search, iterative deepening search, hill climbing, simulated annealing, best first search and A* algorithm, AND-OR graphs and AO* algorithm, iterative-deepening A*, recursive best first search, search for solving constraint satisfaction problems; Mini-max search for two-player games, alpha-beta pruning.	10
3	**Planning:**	
	Components of a planning system, goal-stack planning.	03
4	**Knowledge Representation (KR) and Reasoning:**	
	Predicate logic as a KR paradigm, inference rules, soundness and completeness of inference rules, unification, resolution and resolution refutation, introduction to semantic nets and frames as KR paradigms.	06
5	**Reasoning under Uncertainty:**	
	Review of required concepts of probability, Probabilistic reasoning and Bayesian networks, Dempster-Shafer theory; Fuzzy set theory, fuzzy relations, fuzzification, fuzzy value assignment methods, inference and fuzzy composition methods, defuzzification methods, applications and recent developments.	10

6	**Introduction to Artificial Neural Networks:** Biological vs artificial neural networks, activation functions, supervised and unsupervised learning, neuro processing and neural network learning, learning rules, single layer perceptrons and classification, introduction to multilayer neural networks.	07
7	**Prolog programming:** Introduction to Prolog, facts, rules, goals, how Prolog answers the question, recursion, arithmetic, lists, controlling backtracking using cut and fail predicates, input/output, file manipulation.	06
	TOTAL	**45**

List of References:

1. E. Rich, K. Knight,"Artificial Intelligence", TMH.
2. N. J. Nilsson, "Artificial Intelligence: A New Synthesis", Harcourt Publishers.
3. Russell, Norvig, "Artificial Intelligence: A Modern Approach", Pearson
4. Tomthy Ross, "Fuzzy Logic and Engineering Application", McGraw Hill International
5. Ivan Bratko, "PROLOG Programming for Artificial Intelligence", Pearson Education

Course Outcomes (COs):

After the successful completion of this course the student will be able to

1. Represent a problem as a 'state space search' and apply heuristic approaches to design a computational solution to intractable problems
2. Implement mini-max search technique for development of simple two player games
3. Represent a given knowledge, stated in simple English statements, in first order predicate logic, frames, and semantic nets
4. Apply various inference rules to infer new knowledge in logic based 'knowledge representation formalism'
5. Demonstrate the knowledge of Bayesian networks, artificial neural networks, and fuzzy logic based systems
6. Write simple Prolog programs and explore more sophisticated Prolog code on their own