SEMESTER	3
Paper Number	MCMS 4312
Paper Title	Artificial Intelligence
No. of credits	6
Theory / Composite	Composite
No. of periods assigned	Th: 4 Pr: 4
Name of faculty member(s)	
Course description / objectives	On completion of this course, the students will be able to: 1. define and understand the various applications of Artificial intelligence. 2. design various applications of agent-based systems including multi-agents and intelligent agents. 3. apply various heuristic search techniques to their relevant application areas. 4. understand the various forms of knowledge representation. 5. identify the various techniques of reasoning for uncertain knowledge. 6. understand the application areas of Natural Language Processing along with their limitations.
Syllabus	**Theory - 60 marks** Introduction: AI applications, AI techniques, AI Problems. Importance of AI State Space search: State Space Graphs, Implicit and explicit graphs, Production Systems, formulating the state-space; Uninformed search: breadth first search, depth first search; Uniform cost algorithm; Informed search: use of heuristics, problem characteristics and applications Intelligent Agents: What is an agent? Intelligent Agents; Multi agent systems; Applications; The downside. Heuristic Search Techniques: Generate and Test, hill climbing, simulated annealing, Best first search, A* algorithm, Agenda driven search, Problem Reduction, AO* algorithm, Constraint satisfaction, Means end analysis. Game Playing: Minmax and game trees, refining minmax, Alpha – Beta pruning. Knowledge Representation: First order predicate calculus, resolution, unification, natural deduction system, refutation, logic programming, semantic networks, frame system, value inheritance, conceptual dependency, Ontologies. Uncertainty: different types of uncertainty - degree of belief and degree of truth, various probability constructs - prior probability, conditional probability, probability axioms, probability distributions, and joint probability distributions, Bayes' rule, other approaches to modelling uncertainty such as Dempster-Shafer theory and fuzzy sets/logic. Learning: Rote learning, learning by taking advice, learning by problem solving, learning by examples. Natural language processing: component steps of communication, contrast between formal and natural languages in the context of grammar, parsing, and semantics **Lab - 40 marks**
Reading/Reference Lists	1. S. Russell and P. Norvig, Artificial Intelligence: A Modern Approach, Pearson Education, 2006. 2. Elaine Rich and Kelvin Knight, Artificial Intelligence, Tata McGraw Hill, 2002. 3. Nils J Nilson, Artificial Intelligence: A New Synthesis, Morgan Kaufmann Publishers , Inc., San Francisco, California, 2000. 4. R. Akerkar, Introduction to Artificial Intelligence, Prentice-Hall of India, 2005

	5. Dan W. Patterson, Introduction to Artificial Intelligence and Expert Systems, Prentice Hall of India, 2006. 6. Nils J. Nilson, Principles of Artificial Intelligence, Narosa Publishing House, 2001 7. W.F. Clocksin and C.S. Mellish, Programming in PROLOG, Narosa Publishing House, 2002. 8. Ivan Bratko, Prolog Programming for Artificial Intelligence, Pearson, 2018.
Evaluation	Total – 100 (Theory – 60, Practical – 40) Theory – CIA – 10 Semester Examination – 50