University School of Automation and Robotics
GURU GOBIND SINGH INDRAPRASTHA UNIVERSITY
East Delhi Campus, Surajmal Vihar
Delhi - 110092

	L	T/P	Credits
Paper Code: ARA 203 **Subject:** Artificial Intelligence and Its Applications	4	-	4

Marking Scheme

1. Teachers Continuous Evaluation: 25 Marks
2. End Term Theory Examination: 75 Marks

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks : 75**

1. There should be 9 questions in the end term examination question paper
2. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 15 marks.
3. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be 15 marks.
4. The questions are to be framed keeping in view the learning outcomes of course/paper. The standard/ level of the questions to be asked should be at the level of the prescribed textbooks.
5. The requirement of (scientific) calculators/ log-tables/ data-tables may be specified if required

Course Outcomes:

CO1:	Ability of students to implement the mechanisms of robot along with its grippers. Furthermore to understand kinematics of robot using DH representation
CO2:	Ability of students to utilize the differential motion and velocities of robot using jacobian.
CO3:	Ability of students to use the dynamic analysis of forces using Lagrangian and Newtonian method.
CO4:	Ability of students to implement the online and offline programming of robots.

Course Outcomes (CO) to Programme Outcomes (PO) Mapping (Scale 1: Low, 2: Medium, 3: High

CO/PO	PO01	PO02	PO03	PO04	PO05	PO06	PO07	PO08	PO09	PO10	PO11	PO12
CO1	3	3	3	3	3	2	-	-	1	3	1	2
CO2	3	3	3	3	3	1	-	-	2	3	1	2
CO3	3	3	3	3	3	1	-	-	3	3	2	3
CO4	3	3	3	3	3	3	-	-	3	3	2	3

Unit I **[8]**

Introduction to Artificial Intelligence: AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.

Expert System: Definition, role of knowledge, architecture, and life cycle of Expert System

Unit II **[12]**

Searching: Searching for solutions, uninformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A*, AO* Algorithms, Problem reduction, Game Playing-Adversarial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions.

Knowledge representation issues, predicate logic: logic programming, semantic nets-frames and inheritance, constraint propagation, representing knowledge using rules, rules-based deduction systems. Reasoning under uncertainty, review of probability, Baye's probabilistic interferences and dempster Shafer theory.

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Unit III **[10]**

Fuzzy Systems: Crisp sets, Fuzzy sets: Basic types and concepts, characteristics and significance of paradigm shift, Representation of fuzzy sets, Operations, membership functions, Classical relations and fuzzy relations, fuzzification, defuzzification, fuzzy reasoning, fuzzy inference systems, fuzzy control system, fuzzy clustering, applications of fuzzy systems. Euro-fuzzy systems, neuro-fuzzy modeling; neuro-fuzzy control.

Unit IV **[10]**

Introduction to Machine Learning: What is Machine Learning, Learning from Data, History of Machine Learning, Big Data for Machine Learning, Leveraging Machine Learning, Descriptive vs Predictive Analytics, Artificial Intelligence and Machine Learning, Types of Machine Learning, Supervised, Unsupervised, Semi-supervised, Reinforcement Learning, Introduction to Neural Network and Deep Learning.

Textbooks

1. Elaine R., Kevin K. (2009). *Artificial Intelligence*. Tata McGraw Hill.
2. Ross T. J. (1995). *Fuzzy Logic with Engineering Applications*. McGraw-Hill.
3. Russel S., Norvig P. (2003). *Artificial Intelligence – A Modern Approach*. Second Edition. Pearson Education
4.

Reference Books

1. Nilsson N. (1982). *Principles of Artificial Intelligence*. Morgan Kaufmann.
2. Poole D., Mackworth A., Goebel R. (1998). *Computational Intelligence: a logical approach*. Oxford University Press.

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