

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-V EXAMINATION – SUMMER 2025

Subject Code:3154202

Date:15-05-2025

Subject Name:Fundamentals of Artificial Intelligence

Time:02:30 PM TO 05:00 PM

Total Marks:70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Describe the goals of AI research and the different approaches used in AI problem-solving.	03
	(b) Explain the following terms: a) Agent b)Environments	04
	(c) Describe the components of an agent-based system and how they interact with the environment.	07
Q.2	(a) Explain the basic idea behind breadth-first search (BFS) and provide an example of its application in finding the shortest path in a graph.	03
	(b) Compare and contrast the A* algorithm and the AO* algorithm, highlighting their similarities and differences in terms of optimality and memory usage.	04
	(c) Discuss the concept of rationality in AI and explain how rationality is measured in agent decision-making processes.	07
	OR	
	(c) Explain the concept of alpha-beta pruning and how it improves the efficiency of the mini-max algorithm by eliminating redundant search branches.	07
Q.3	(a) Describe logics commonly used for non-monotonic reasoning.	03
	(b) Define probability and Bayes' theorem, and explain their roles in statistical reasoning and decision-making.	04
	(c) Describe various phases of Natural Language Processing.	07
	OR	
Q.3	(a) Describe the basic idea behind hill climbing search and discuss its limitations when dealing with local optima.	03
	(b) Explain the principles of Bayesian networks and Dempster-Shafer theory, and discuss their applications in handling uncertainty and making inferences.	04
	(c) Discuss Dempster-Shafer Theory.	07
Q.4	(a) Define fuzzy rules and explain how they are used in fuzzy logic systems.	03
	(b) Explain the working of the decision tree.	04

	(c)	Explain how decision trees are learned from training data using algorithms such as ID3 or CART, and discuss the criteria used for splitting nodes in a decision tree.	07
		OR	
Q.4	(a)	Explain the bias-variance trade-off in machine learning and how it relates to the problem of overfitting.	03
	(b)	Write the advantages and disadvantages of collaborative filtering compared to content-based filtering in recommendation systems.	04
	(c)	write an application of fuzzy sets for control.	07
Q.5	(a)	Explain the back-propagation algorithm and how it is used to train artificial neural networks	03
	(b)	Draw and Explain a Neural Network to represent AND and OR gates.	04
	(c)	Explain the challenges associated with training deep neural networks.	07
		OR	
Q.5	(a)	Define natural language processing (NLP) and explain its significance in artificial intelligence.	03
	(b)	Explain the concept of overfitting in neural networks.	04
	(c)	Discuss Syntactic Processing.	07
