

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER- V EXAMINATION – SUMMER 2026****Subject Code:3154202****Date:25-05-2026****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	Attribute
Q.1	(a) Define the term Artificial Intelligence and list various application domains of Artificial Intelligence.	03	(U)
	(b) Compare and contrast:	04	(A)
	(i) Forward and Backward Reasoning		
	(ii) Breadth First Search and Depth First Search		
	(c) Explain the working of min-max algorithm for two-player game. List out the advantages, disadvantages, and properties of min-max algorithm.	07	(U)
Q.2	(a) Explain the terms over-fitting and under-fitting in Machine Learning.	03	(R)
	(b) Write the facts and rules for the following statements: "Animals that are mammals have hair. If an animal has hair, it is warm-blooded." "Dog, human, and dolphin are mammals and have hair." Considering the "warm_blooded" rule, what will the following queries return: warm_blooded(dog). warm_blooded(human). warm_blooded(dolphin).	04	(A)
	(c) What is heuristic function? Explain Informed Search Algorithms with example.	07	(U)
	OR		
	(c) What are the requirements of Knowledge Representation System? Explain the approaches of Knowledge Representation with examples.	07	(R)
Q.3	(a) Explain in brief Reinforcement Learning.	03	(U)
	(b) From a standard deck of playing cards, a single card is drawn. The probability that the card is king is $4/52$, then calculate posterior probability $P(\text{King} \text{Face})$, which means the drawn face card is a king card.	04	(A)
	(c) Illustrate the different uses cases of applying Machine Learning in Finance Industry.	07	(U)
	OR		
Q.3	(a) What are the attribute selection measures for decision tree algorithm, explain in brief.	03	(R)
	(b) What is Cost function? Give the cost function for Linear Regression and define the term Gradient Descent.	04	(U)
	(c) Explain types of cross validation techniques.	07	(U)

Q.4	(a) What is the difference between model parameters and hyperparameters?	03	(A)
	(b) Explain the working of k-nearest neighbor algorithm.	04	(U)
	(c) Analyze and explain customer feedback for E-commerce using sentiment analysis.	07	(A)
OR			
Q.4	(a) What is the significance of bias and variance in Machine Learning?	03	(R)
	(b) What is collaborative filtering? List various real-world applications where collaborative filtering is applied.	04	(U)
	(c) Draw the structure of Artificial neuron and explain different types of activation functions used in Artificial Neural Network.	07	(R)
Q.5	(a) What is discourse and pragmatic processing in Natural Language Processing?	03	(R)
	(b) Differentiate between fuzzy sets and crisp sets and discuss operations performed on fuzzy sets.	04	(A)
	(c) Explain text classification and sentiment analysis using Bag-of-Words model.	07	(U)
OR			
Q.5	(a) Discuss Dempster-Shafer Theory	03	(R)
	(b) Discuss the difference between perceptron neural network and linear regression.	04	(A)
	(c) Consider the following paragraph - Independence Day is one of the important festivals for every Indian citizen. It is celebrated on the 15th of August each year ever since India got independence from the British rule. The day celebrates independence in the true sense. Demonstrate various steps of Natural Language Processing for the above paragraph.	07	(A)