GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2024

Subject Code:3170924   **Date:07-12-2024**

Subject Name: AI and Machine Learning

Time:10:30 AM TO 01:00 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)**	Explain the significance of artificial intelligence and how it relates to human life.	**03**
	(b)	Give an example to illustrate the difference between fuzzy and crisp logic.	**04**
	(c)	Describe the main distinctions between supervised and unsupervised learning using a diagrammatic approach.	**07**
Q.2	**(a)**	Define the following: (i) Reinforcement Learning (ii) Deep Learning (iii) Semi-supervised Learning.	**03**
	(b)	What are the main distinctions between the methodologies of Classification and Regression in Supervised Machine Learning?	**04**
	(c)	With the use of a flowchart outlining the Genetic Algorithm's process.	**07**

OR

	(c)	Describe the concept of decision trees in a machine learning setup for classification. What do information gain and entropy mean in relation to a decision tree?	**07**
Q.3	**(a)**	Define terms: (i) Hypothesis Space, (ii) Inductive Bias.	**03**
	(b)	Describe the logistic regression approach. Summarize about the differences between linear and logistic regression.	**04**
	(c)	Explain the idea of K-means clustering using a schematic graphic. What distinguishes K-means clustering from KNN? Identify the widely used distance metrics in the KNN algorithm.	**07**

OR

Q.3	**(a)**	Define the following in context of Machine Learning: (i) Accuracy (ii) Precision (iii) Over-fitting.	**03**
	(b)	Explain in detail about Dimensionality Reduction Techniques: (i) Feature Selection, (ii) Feature Extraction.	**04**
	(c)	Explain the concept of support vector machines (SVM) using a schematic diagram. Describe the benefits and function of kernel functions in the case of a non-linear dataset.	**07**
Q.4	**(a)**	Describe about Biological Neural Networks and Artificial Neural Networks.	**03**
	(b)	What is the purpose of selection (reproduction) operator in Genetic Algorithm? Explain any one selection operator in detail.	**04**
	(c)	Explain agglomerative hierarchical clustering in brief.	**07**

OR

Q.4	**(a)**	Explain the Fuzzy IF-THEN rule along with the fuzzy inference system.	**03**
	(b)	What are the terms defuzzification and fuzzification? What does the term "universe of discourse" mean?	**04**
	(c)	Describe Fuzzy compliment, Union, and intersection by using any suitable example.	**07**

Q.5	**(a)**	What is Fuzzy Inference System (FIS)? Explain with neat and clean diagram.	**03**
	(b)	Explain any one Genetic Algorithm based application.	**04**
	(c)	Explain back propagation neural networks. Discuss the steps involved in back propagation algorithm.	**07**

OR

Q.5	**(a)**	Explain genetic algorithm operator: Cross over with binary string.	**03**
	(b)	Explain the concept of Artificial neurons. Discuss the different types of activation functions employed in neural networks.	**04**
	(c)	What is the importance of activation function in neural networks? Explain the concept of forward-phase and backward-phase in the weight-update algorithm used in neural networks with a suitable diagram.	**07**

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