

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2021****Subject Code:3170924****Date:13/12/2021****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
<b>Q.1</b>	(a) Clearly explain the concept of Artificial Intelligence and its importance in the modern-day society.	<b>03</b>
	(b) What are fundamental differences between Classification and Regression based approaches in Supervised Machine Learning?	<b>04</b>
	(c) With the help of a diagrammatic approach, state key differences between Supervised learning and Unsupervised learning.	<b>07</b>
<b>Q.2</b>	(a) With respect to Linear Regression, discuss the key differences between Univariate and Multivariate Linear Regression. How do we optimize the model coefficients in Linear Regression?	<b>03</b>
	(b) What is Bayesian Classifier in Machine Learning? With respect to the principle of supervised learning classification, discuss the steps to design an E-mail Spam filter.	<b>04</b>
	(c) Explain Logistic Regression approach in Machine Learning. Is Logistic Regression a Classification or Regression technique?	<b>07</b>
	<b>OR</b>	
	(c) Using mathematical approach, explain Linear Support Vector Machines (SVM) in the context of Supervised Machine Learning. How can we deal with non-linear problems using SVM?	<b>07</b>
<b>Q.3</b>	(a) Explain Fuzzy Logic Control with the help of a block diagram.	<b>03</b>
	(b) With the help of an illustrative diagram, explain the key differences between KNN and K-means clustering. What are the common distance metrics used in KNN?	<b>04</b>
	(c) Explain Recommendation Systems and types of filtering techniques used for the same. Briefly discuss the need for and importance of Recommendation Systems for an E-Commerce platform.	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) Define the following in context of Machine Learning: (i) Accuracy (ii) Precision (iii) Over-fitting	<b>03</b>
	(b) Discuss the concept of a Decision Tree in Machine Learning Regression or Classification task with the help of an illustrative example.	<b>04</b>
	(c) With the help of an illustrative diagram, explain the concept of Artificial Neural Network (ANN) and Backpropagation (BP) training algorithm for weight update. What is difference in the training procedure of an ANN and SVM?	<b>07</b>

<b>Q.4</b>	<b>(a)</b> Define the following: (i) Reinforcement Learning (ii) Deep Learning (iii) Semi-supervised Learning	<b>03</b>
	<b>(b)</b> What do you mean by Fuzzy Inference System (FIS)? Explain the same with the help of an illustrative block diagram.	<b>04</b>
	<b>(c)</b> With the help of a flowchart, explain the concept of Genetic Algorithm and importance of Mutation and Crossover for the same.	<b>07</b>
<b>OR</b>		
<b>Q.4</b>	<b>(a)</b> Define the following (i) Sigmoid function in Logistic Regression (ii) Perceptron Learning (iii) Cross-validation	<b>03</b>
	<b>(b)</b> Explain the concept of Entropy and Information Gain with respect to Decision Trees.	<b>04</b>
	<b>(c)</b> Discuss the importance of activation functions in ANNs. What are the common activation functions used for Regression and Classification tasks?	<b>07</b>
<b>Q.5</b>	<b>(a)</b> Define the following: (i) Gradient descent algorithm (ii) False Positive & False Negative w.r.t Confusion Matrix (iii) AUC-ROC curve	<b>03</b>
	<b>(b)</b> Clearly explain how Machine Learning (ML) is useful in healthcare sector and financial sector.	<b>04</b>
	<b>(c)</b> What is difference between agglomerative and divisive clustering? Explain the same with the help of a dendrogram.	<b>07</b>
<b>OR</b>		
<b>Q.5</b>	<b>(a)</b> Define the following: (i) Fuzzy sets (ii) Membership function (iii) Defuzzification	<b>03</b>
	<b>(b)</b> Explain the concept of decision boundary and Kernel trick w.r.t Support vector machines (SVM).	<b>04</b>
	<b>(c)</b> Define time-series and discuss regression-based approach for wind speed forecasting based on Univariate and Multivariate regression. What is optimal training/testing ratio for this approach? What are common covariates/features used for predicting wind speed?	<b>07</b>

\*\*\*\*\*

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

## **GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE - SEMESTER-VII (NEW) EXAMINATION – SUMMER 2022**

**Subject Code:3170924**

**Date:03/06/2022**

**Subject Name:AI and Machine Learning**

**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.

- Q.1**
- |     |   |           |
|-----|---|-----------|
| (a) | Compare Artificial intelligence and human intelligence. | <b>03</b> |
| (b) | Explain term 'Hypothesis Space'.                        | <b>04</b> |
| (c) | Explain classification of Machine learning in details.  | <b>07</b> |

- Q.2**
- |     |   |           |
|-----|---|-----------|
| (a) | Explain Biological neurons and artificial neural networks.  | <b>03</b> |
| (b) | Explain concept of supervised learning.   | <b>04</b> |
| (c) | What is the activation function? Explain the different types of activation functions used in ANN's. | <b>07</b> |

**OR**

- |  |  |           |
|--|--|-----------|
|  | (c) Explain Agglomerative Hierarchical Clustering. | <b>07</b> |
|--|--|-----------|
- Q.3**
- |     |   |           |
|-----|---|-----------|
| (a) | Explain collaborative filtering in Machine learning.                              | <b>03</b> |
| (b) | Explain concept of unsupervised learning.   | <b>04</b> |
| (c) | Explain Perceptron NN, Multilayer Perceptron NN, Back-propagation Neural Networks | <b>07</b> |

**OR**

- Q.3**
- |     |   |           |
|-----|---|-----------|
| (a) | Explain concept of learning decision tree.        | <b>03</b> |
| (b) | Explain Dimensionality Reduction technique.       | <b>04</b> |
| (c) | Explain any one neural network-based application. | <b>07</b> |

- Q.4**
- |     |   |           |
|-----|---|-----------|
| (a) | Compare conventional sets vs fuzzy sets.    | <b>03</b> |
| (b) | Explain membership function of fuzzy logic. | <b>04</b> |
| (c) | Explain operation of fuzzy sets.            | <b>07</b> |

**OR**

- Q.4**
- |     |  |           |
|-----|--|-----------|
| (a) | Explain concept of logistic Regression.        | <b>03</b> |
| (b) | Explain concept of support vector machine.     | <b>04</b> |
| (c) | Explain any one fuzzy logic-based application. | <b>07</b> |

- Q.5**
- |     |  |           |
|-----|--|-----------|
| (a) | Compare Genetic algorithm with traditional optimization Technique. | <b>03</b> |
| (b) | Explain genetic algorithm operator: Selection.                     | <b>04</b> |
| (c) | Explain Methods of Defuzzification.                                | <b>07</b> |

**OR**

- Q.5**
- |     |  |           |
|-----|--|-----------|
| (a) | Explain genetic algorithm operator: Reproduction.    | <b>03</b> |
| (b) | Explain genetic algorithm operator: Cross over.      | <b>04</b> |
| (c) | Explain any one genetic algorithm based application. | <b>07</b> |

\*\*\*\*\*