

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (NEW) EXAMINATION – SUMMER 2022****Subject Code:3171617****Date:14/06/2022****Subject Name:Applied 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) Define the terms: **03**
 a) Machine Learning b) Unstructured data c) Probability
- (b) Discuss two applications of machine learning. **04**
- (c) Do the following: **03**
 a) Human Learning Vs Machine Learning **03**
 b) Explain Monte Carlo Approximation with suitable example. **04**
- Q.2**
- (a) Discrete Distribution Vs Continuous Distribution **03**
- (b) Define the terms: **04**
 a) Cross Validation b) Inductive bias c) Hypothesis space d) Random Variable
- (c) In an oral exam you have to solve exactly one problem, which might be one of three types, A, B, or C, which will come up with probabilities 30%, 20%, and 50%, respectively. During your preparation you have solved 9 of 10 problems of type A, 2 of 10 problems of type B, and 6 of 10 problems of type C. **07**
 (a) What is the probability that you will solve the problem of the exam?
 (b) Given you have solved the problem, what is the probability that it was of type A?
- OR**
- (c) Consider a radar station monitoring air traffic. For simplicity we chunk time into periods of five minutes and assume that they are independent of each other. Within each five minute period, there may be an airplane flying over the radar station with probability 5%, or there is no airplane (we exclude the possibility that there are several airplanes). If there is an airplane, it will be detected by the radar with a probability of 99%. If there is no airplane, the radar will give a false alarm and detect a non-existent airplane with a probability of 10%. **07**
 a) How many airplanes fly over the radar station on average per day (24 hours)?
 b) How many false alarms (there is an alarm even though there is no airplane) and how many false no-alarms (there is no alarm even though there is an airplane) are there on average per day?
- Q.3**
- (a) Distinguish between supervised learning, semi-supervised learning, and Unsupervised learning. **03**
- (b) Explain with suitable example. **04**

- a) Multivariate regression b) Logistic regression
- (c) Explain Rosenblatt's perceptron model. How can a set of data be classified using a simple perceptron? Using a simple perceptron with weights w_0 , w_1 , and w_2 as -1 , 2 , and 1 , respectively, classify data points $(3,4)$; $(5, 2)$; $(1, -3)$; $(-8, -3)$; $(-3, 0)$. **07**

OR

- Q.3** (a) Define reinforcement learning. Explain the concept of penalty and reward in reinforcement learning. **03**
- (b) Explain Bayesian belief network with suitable example. **04**
- (c) Explain the learning process of an ANN. Explain with example, the challenge in assigning synaptic weights for the interconnection between neurons. How can this challenge be addressed? **07**
- Q.4** (a) What are the steps in the back-propagation algorithm? Why a multi-layer neural network is required? **03**
- (b) Explain classification steps in detail. **04**
- (c) a) Define CNN. **07**
 b) Enlist 4 applications of CNN.
 c) Explain working of CNN.

OR

- Q.4** (a) State the merits and demerits of Bayes classifier. **03**
- (b) Define and explain MLE and MAP. **04**
- (c) a) Define RNN. **07**
 b) Enlist 4 applications of RNN.
 c) Explain working of RNN.
- Q.5** (a) Explain kNN with suitable example. **03**
- (b) Enlist and explain various hyper parameters which are being tuned for improving the deep learning model. **04**
- (c) Explain a) Regularization and b) Optimization in detail. **07**

OR

- Q.5** (a) Explain K-Means clustering algorithm with suitable example. **03**
- (b) Define slope in a linear regression. Find the slope of the graph where the lower point on the line is represented as $(-3, -2)$ and the higher point on the line is represented as $(2, 2)$. **04**
- (c) Write short note on: **07**
 a) Generative Adversarial Networks
 b) Deep Learning
