

GUJARAT TECHNOLOGICAL UNIVERSITY

BACHELOR OF ENGINEERING – SEMESTER 7 – EXAMINATION – SUMMER 2026

Subject Code: 3171617

Date: 20/05/2026

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 Following terms: 1. Hypothesis space 2. Inductive bias **03**
- (b) State Bayes' theorem and explain its formula. **04**
- (c) Suppose two students train the models in which one uses cross-validation, the other does not. Evaluate which approach is more reliable and why? **07**
- Q.2** (a) Define the terms : 1. Overfitting 2. Underfitting **03**
- (b) Explain how sampling distributions are used in hypothesis testing with a simple example. **04**
- (c) A shopkeeper wants to predict whether tomorrow's sales will be high or low using past data of sales. How can you apply Logistic Regression for this problem? **07**
- OR
- Q.2** (c) A University is having student marks data. How to apply a Decision Tree to decide whether a student will pass or fail? **07**
- Q.3** (a) What is hyperparameter tuning? **03**
- (b) Compare CNN and RNN. **04**
- (c) Define adversarial attack in machine learning. Explain how small changes to input data can fool a trained model with any real-world applications example. **07**
- OR
- Q.3** (a) Enlist 4 applications of RNN. **03**
- (b) Differentiate between supervised learning and unsupervised learning. **04**
- (c) Explain the role of Generator and Discriminator in a GAN with a simple example. **07**
- Q.4** (a) What is the difference between classification and regression? **03**
- (b) State the difference between Maximum Likelihood Estimation (MLE) and Maximum A Posteriori Estimation (MAP). **04**
- (c) 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 $(2, 2)$. **07**
- OR
- Q.4** (a) Explain the concept of sampling distribution. **03**

(b) Compare discrete vs continuous distribution with example. **04**

(c) Explain in brief back propagation algorithm. **07**

Q.5 **(a)** Explain role of activation functions in neural networks. **03**

(b) A population consists of six numbers 4,8,12,16,20,24 .consider all samples of size two which can be drawn without replacement from this population. Calculate i) The Population mean ii) The population standard deviation **04**

(c) Given the 1-D data {2,4,5,10,12,20}, perform one iteration of K-Means clustering with K=2, using initial cluster centers 4 and 12. Assign each data point to the nearest center and compute the updated clusters. **07**

OR

Q.5 **(a)** Explain XOR problem in case of a simple perceptron. **03**

(b) Analyze the working of a Convolutional Neural Network. Compare its performance with a simple feed forward neural network with suitable example **04**

(c) Evaluate the role of parameter estimation methods in deep neural networks. Which approach is most suitable when data is limited. **07**
