

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII EXAMINATION – SUMMER 2025

Subject Code:3171617

Date:08-05-2025

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.

		MARKS
Q.1	(a) Define machine learning. Enlist any four tools and technologies of machine learning.	03
	(b) Define the following terms: i) Event ii) Sample Space iii) Random Variable iv) Inductive bias	04
	(c) For preparation of the exam, a student knows that one question is to be solved in the exam which is either of types A, B, or C. The probabilities of A, B, or C appearing in the exam are 30%, 20%, and 50% respectively. During the preparation, the student solved 9 of 10 problems of type A, 2 of 10 problems of type B, and 6 of 10 problems of type C. (i) What is the probability that the student will solve the problem of the exam?(ii) Given that the student solved the problem, what is the probability that it was of type A?	07
Q.2	(a) Explain the various methods to perform cross validation.	03
	(b) Explain Monte Carlo Approximation with suitable example.	04
	(c) According to the U.S. Census Bureau, approximately 6% of all workers in Jackson, Mississippi, are unemployed. In conducting a random telephone survey in Jackson, what is the probability of getting two or fewer unemployed workers in a sample of 20?	07
	OR	
	(c) A study is conducted in a company that employs 800 engineers. A random sample of 50 engineers reveals that the average sample age is 34.3 years. Historically, the population standard deviation of the age of the company's engineers is approximately 8 years. Construct a 98% confidence interval to estimate the average age of all the engineers in this company.	07
Q.3	(a) Discrete Distribution Vs Continuous Distribution.	03
	(b) Write short note on Bayesian Belief Network.	04
	(c) Suppose you have a population of test scores for a large group of students. The population's mean test score is 75, and the population's standard deviation is 10. You take random samples of 30 students' test scores from this population. Calculate the following: a. The mean and standard deviation of the sample means. b. The probability that the sample mean of one of your samples is greater than 78. c. The probability that the sample mean of one of your samples is between 72 and 78. Use the Central Limit Theorem to solve this problem.	07

OR

- Q.3** (a) Enlist the factors determining the effectiveness of SVM. **03**
(b) Explain Bays theorem with example. **04**
(c) An antibiotic resistance test (random variable T) has 1% false positives (i.e. 1% of those not resistance to an antibiotic show positive result in the test) and 5% false negatives (i.e. 5% of those actually resistant to an antibiotic test negative). Let us assume that 2% of those tested are resistant to antibiotics. Determine the probability that somebody who tests positive is actually resistant (random variable D). **07**

- Q.4** (a) Discuss OOB error and variable importance in random forest. **03**
(b) Explain with suitable example. **04**
i) Multivariate regression ii) Logistic regression
(c) Explain the use of association rule mining. Write and explain the steps of Apriori algorithm. **07**

OR

- Q.4** (a) Define reinforcement learning. Explain the concept of penalty and reward in reinforcement learning. **03**
(b) Define and explain MLE and MAP. **04**
(c) Define the following terms **07**
a. Sample error
b. True error
c. Precision
d. Expected value
e. Variance
f. Standard Deviation
g. Recall

- Q.5** (a) Write short note on Adversarial Attacks. **03**
(b) Define Perceptron. Explain its working. **04**
(c) a) Define RNN. **07**
b) Enlist 4 applications of RNN.
c) Explain working of RNN.

OR

- Q.5** (a) Write short note on GAN with its architecture. **03**
(b) Enlist and explain various hyper parameters which are being tuned for improving the deep learning model. **04**
(c) a) Define CNN. **07**
b) Enlist 4 applications of CNN.
c) Explain working of CNN.
