Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – October 2025

Date: 09-10-2025 **Time:** 02.00pm to 03.30pm

School: SOCSE	**Program:** COM	
Course Code: COM2504	**Course Name:** Applied Machine Learning	
Semester: V	**Max Marks**: 50	**Weightage**: 25%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**25**	**25**	**-**	**-**	**-**

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **5Q x 2M=10M**

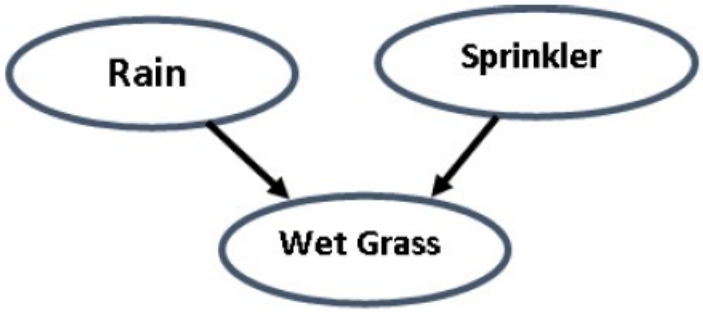
1	State the term used when sampling is performed with replacement.	**2 Marks**	**L1**	**CO1**
2	State 2 different types of supervised learning.	**2 Marks**	**L1**	**CO1**
3	State 2 different types of categorical features.	**2 Marks**	**L1**	**CO1**
4	State 2 different types of data imputation methods.	**2 Marks**	**L1**	**CO1**
5	State 2 different types of loss functions.	**2 Marks**	**L1**	**CO1**

Part B

Answer the Questions. **Total Marks 40M**

6.	The softmax function, which takes a vector Z as input, is given using the following formula: $Softmax(Z)=[\frac{e^{Z_i}}{\sum_i e^{Z_i}}]$. Explain (in **NOT MORE THAN 1 PAGE**) a proof that the output of the softmax function is a probability distribution.	**10 Marks**	**L2**	**CO2**
	Or			

7.	Compute the value of Softmax([2025, 2026]).	**10 Marks**	**L2**	**CO2**

8.	Consider the following Bayesian Network:  Given the following probabilities: P(Rain) = 0.1 P(Sprinkler) = 0.2 P(Wet Grass | Rain, Sprinkler) = 0.8 P(Wet Grass | Rain, ~Sprinkler) = 0.7 P(Wet Grass | ~Rain, Sprinkler) = 0.6 P(Wet Grass | ~Rain, ~Sprinkler) = 0.5 Calculate the probability that the sprinkler is on, given that the grass is wet and it has rained.	**15 Marks**	**L3**	**CO1**
	Or			
9.	For the Bayesian network and data given in **Question 8**, calculate the probability that it is raining, given that the sprinkler is on and the grass is wet.	**15 Marks**	**L3**	**CO1**

10.	Use a Naïve Bayes classifier for the following data: **Outlook** | **Temperature** | **Humidity** | **Windy** | **Play?** **Rainy** | **Hot** | **High** | **False** | **No** **Rainy** | **Hot** | **High** | **True** | **No** **Overcast** | **Hot** | **High** | **False** | **Yes** **Sunny** | **Mild** | **High** | **False** | **Yes** **Sunny** | **Cool** | **Normal** | **False** | **Yes** **Sunny** | **Cool** | **Normal** | **True** | **Yes** **Overcas** | **Cool** | **Normal** | **True** | **No**	**15 Marks**	**L3**	**CO2**

	t							
	Rainy	**Mild**	**High**	**False**	**No**			
	Rainy	**Cool**	**Normal**	**False**	**Yes**			
	Sunny	**Mild**	**Normal**	**False**	**Yes**			
	Rainy	**Mild**	**Normal**	**True**	**Yes**			
	Overcast	**Mild**	**High**	**True**	**Yes**			
	Overcast	**Hot**	**Normal**	**False**	**Yes**			
	Sunny	**Mild**	**High**	**True**	**No**			
	For an input of X = {Rainy, Cool, High, True}, calculate the output predicted by the classifier.							
	Or							
11.	For the training data given in **Question 10**, calculate the output predicted by the classifier for the input X = {Overcast, Mild, Normal, True}.					**15 Marks**	**L3**	**CO2**