Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Mid - Term Examinations – October 2025

Date: 07-10-2025 **Time:** 09.30am to 11.00am

School: SOE	**Program:** B. Tech	
Course Code: ECE3025	**Course Name:** Artificial Intelligence using Python	
Semester: V	**Max Marks**: 50	**Weightage**: 25%

CO - Levels	CO1	CO2	CO3	CO4	CO5	CO6
Marks	30	20	0	0	0	0

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	Explain the concepts of supervised and unsupervised learning. Illustrate your answer with one suitable example for each type of learning approach.	**2 Marks**	**L1**	**CO1**
2	What are the libraries used for Data Visualization and Data preprocessing in Python.	**2 Marks**	**L2**	**CO1**
3	Deep learning and Machine Learning are under the umbrella of artificial intelligence. How does deep learning differ from machine learning?	**2 Marks**	**L1**	**CO1**
4	Differentiate between classification and regression problems in machine learning, and provide one real-world example for each to demonstrate their application.	**2 Marks**	**L2**	**CO1**
5	A confusion matrix is used in evaluating the performance of a classification model. Define "Accuracy" and "Precision" with an example.	**2 Marks**	**L2**	**CO1**

Part B

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

<table>
<tr><td>6.</td><td>a.</td><td>Label encoding refers to the process of transforming the word labels into numerical form. How does label encoding perform if the input labels.

i) input_labels = ['red', 'black', 'red', 'green', 'black', 'yellow', 'white'] and
ii) input_labels = (1, 2, 0, 3).</td><td>5 Marks</td><td>L2</td><td>CO 1</td></tr>
<tr><td></td><td>b.</td><td>Data preprocessing plays a crucial role in machine learning. Let us assume that the data set we are working with is

([-1.9, 2.3, 2.1, 0.8], [-2.9, 1.5, -0.8, 2.0], [3.2, -2.5, 2.7, 0.9]).

This data set needs to be binarized with a threshold of 2.5 for preprocessing. Then what is binarized data for the given data set?</td><td>5 Marks</td><td>L2</td><td>CO 1</td></tr>
<tr><td colspan="6">Or</td></tr>
<tr><td>7.</td><td>a.</td><td>Assume the classifier for odds of passing course Log (odds) = -64+2* hours. the given data sets are as
<table><tr><th>Hours</th><th>Pass(1)/Fail(0)</th></tr><tr><td>29</td><td>0</td></tr><tr><td>15</td><td>0</td></tr><tr><td>33</td><td>1</td></tr><tr><td>28</td><td>1</td></tr><tr><td>45</td><td>1</td></tr></table>i) Calculate the probability of pass who studied 32 hours
ii) How many hours student should study that makes he will pass the course with the probability of more than 90%</td><td>5 Marks</td><td>L2</td><td>CO 1</td></tr>
<tr><td></td><td>b.</td><td>Consider the provided confusion matrix. Calculate the specified performance metrics.
(i) Accuracy
(ii) Precision
(iii) Recall
(iv) F1 Score
<table><tr><td>n=165</td><td>Predicted: NO</td><td>Predicted: YES</td></tr><tr><td>Actual: NO</td><td>50</td><td>10</td></tr><tr><td>Actual: YES</td><td>5</td><td>100</td></tr></table></td><td>5 Marks</td><td>L2</td><td>CO 1</td></tr>
</table>

8.	**a.**	A regression model is used to predict sales data of a company (in thousands) for five weeks as shown below: Apply the Linear regression algorithm to predict 7^{th} and 10^{th} weeks sales. **Week (X) / Sales (Y)** **1 / 1.2** **2 / 1.8** **3 / 2.6** **4 / 3.2** **5 / 3.8**	**10 Marks**	**L2**	**CO1**
		Or			
9.	**a.**	A linear regression model is used to predict the Marks of six students as shown below: Apply the Linear Regression algorithm and find the best fit Regressor of the model. Show all steps involved in your calculations and interpret the significance of the results. Hours Studied (X) / Marks Obtained (Y) 2 / 60 3 / 65 4 / 75 5 / 80 6 / 85	**10 Marks**	**L2**	**CO1**

10.	**a.**	A spam email detection system was tested on 100 emails, and the results are summarized as below: **Actual Values:** There are 100 emails. 70 are not spam, and 30 are spam. **Predictions:** Your model predicted 80 as not spam and 20 as spam. **Out of the 30 spam emails:** The model correctly classified 18 as spam (True Positives). The model classified 12 spam emails as not spam (False Negatives). **Out of the 70 non-spam emails:** The model correctly classified 62 as not spam (True Negatives). The model classified 8 non-spam emails as spam (False	**10 Marks**	**L2**	**CO 2**

		Positives). **PREDICTED** / **PREDICTED** / **Total** **ACTUAL** 18 12 30 **ACTUAL** 8 62 70 **Total** 26 74 100 Using the given confusion matrix, apply classification performance metrics to calculate the following: Accuracy, Precision, Recall (Sensitivity), Specificity, and F1-Score. Interpret the significance of these metrics in evaluating the model's performance.			
		Or			
11.	**a.**	Differentiate between supervised learning and unsupervised learning in terms of data, objectives, and applications.	**10 Marks**	**L2**	**CO 2**

12.	**a.**	Illustrate the working principle of the Support Vector Machine (SVM) algorithm in detail. Include a labeled diagram to explain concepts such as hyperplane, support vectors, and margin, and describe how SVM performs classification on linearly and non-linearly separable data.	**10 Marks**	**L3**	**CO 2**
		Or			
13.	**a.**	How do you draw the 'HYPERPLANE' in given data points? The points (4,1), (4, -1) and (6,0) are belongs to positive class and points (1,0), (0,1) and (0, -1) are belongs to negative class	**10 Marks**	**L3**	**CO 2**