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# B.M.S. College of Engineering, Bengaluru-560019

**Autonomous Institute Affiliated to VTU**

## October 2024 Supplementary Examinations

**Programme: B.E.** **Semester: VI**
**Branch: Electronics and Communication Engineering** **Duration: 3 hrs.**
**Course Code: 22EC6PE2ML** **Max Marks: 100**
**Course: Machine Learning**

**Instructions**: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

| | | | CO | PO | Marks |
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| | | **UNIT – I** | | | |
| 1 | a) | Using suitable python libraries, Develop suitable code for the following:<br>i) Print a 3 x 3 matrix A<br>ii) Create a 2D array of size 5 x 5 with ones on diagonal and zero elsewhere<br>iii) Create a dataframe with people, location and age, Display the dataframe.<br>iv) Assume a dataset of 150 samples with four features and three classes, using suitable Library function split 75% of data as training and remaining as test set. Display the shape of train and test set with labels. | *CO* 3 | *PO3* | **10** |
| | b) | Explain the Reinforcement learning and mention few of its applications. | *CO* 1 | *PO1* | **06** |
| | c) | Mention the machine learning techniques for the following problems:<br>(i)Prediction of house price from dataset (ii)Prediction of relation between two products in a grocery store (iii)Prediction of loan eligibility from dataset (iv)Predict if an email is junk mail | *CO* 1 | *PO1* | **04** |
| | | **UNIT – II** | | | |
| 2 | a) | Interpret the Gradient Descent algorithm for linear regression. Write the Linear Regression equation and compute the same for the following Data in Table 2(a) where x is the input and y is the corresponding output. Initialize with suitable values<br>Table 2(a)<br>x: 3, 9, 5, 3<br>y: 8, 6, 4, 2 | *CO* 1 | *PO1* | **10** |

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| | | b) | What is L1 regularization? For Boston Housing dataset with 506 samples and 105 features, write python code snippet to perform the following<br>i) Apply Lasso to the training set<br>ii) Print the training set score and test set score<br>iii) Number of features used<br>Write your inference if the model displays a training set score of 0.29 and test set score of 0.21 with 4 features. | *CO* 3 | ***PO3*** | **10** |
| | | | **OR** | | | |
| | 3 | a) | Fit a OLS model for the following data given in the Table 3 (a) where x is an independent variable and y is dependent variable.<br>x: 3, 4, 5, 6, 7<br>y: 2.5, 3.2, 3.8, 6.5, 11.5<br>Table 3(a) | *CO* 1 | ***PO1*** | **10** |
| | | b) | Define the following regression metrics:<br>i) Mean Absolute Error (ii) Mean Squared Error (iii) $R^2$ score (iv) Root Mean Squared Error.<br>Develop python code to implement the above metrics for a regression model given in the Table 3(b)<br>True Values: 2.5, 3.7, 1.8, 4.0, 5.2<br>Predicted Values: 2.1, 3.9, 1.7, 3.8, 5.0<br>Table 3(b) | *CO* 3 | ***PO3*** | **10** |
| | | | **UNIT - III** | | | |
| | 4 | a) | The data obtained from a questionare survey is given in Table 4(a) where X1 represents acid durability in seconds, X2 represents strength in Kg/square meter, Y is the classification. Apply K _NN algorithm with K=3 and classify special paper tissue with X1= 3 and X2=7. Clearly indicate all the steps. Use Euclidean distance measure.<br>X1: 7, 7, 3, 1<br>X2: 7, 4, 4, 4<br>Y: Bad, Bad, Good, Good<br>Table 4(a) | *CO* 1 | ***PO1*** | **10** |
| | | b) | Analyse the bagging and Boosting techniques in machine learning. Mention the key differences between them. | *CO* 2 | ***PO2*** | **10** |

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| | | | **OR** | | | |
| | 5 | a) | Consider a dataset with two input features x and y and target class ; classes.<br>x=[ 4 5 10 4 3 11 14 8 10 12]<br>y=[21 19 24 17 16 25 24 22 21 21]<br>classes= [0 0 1 0 0 1 1 0 1 1]<br>Write python code to perform the following:<br>i) Plot the data point with classes<br>ii) Build a kNN classifier with K=1<br>iii) Predict the class for the new data point ( 8, 21)<br>iv) Plot the new data point on the plot | ***CO*** 3 | ***PO3*** | **10** |
| | | b) | Analyse the following terms used to split a node in a decision tree<br>i) Gini impurity ii) Entropy | ***CO*** 2 | ***PO2*** | **10** |
| | | | **UNIT – IV** | | | |
| | 6 | a) | Create python code snippet to perform the following<br>i) Load iris data set<br>ii) Split the dataset with 70% training and 30% testing<br>iii) Build Gaussian Naïve bayes model on training set<br>iv) Make predictions on test set | ***CO*** 3 | ***PO3*** | **10** |
| | | b) | Define the following with an example. i) Log loss ii) Jaccard Index iii) Accuracy score | ***CO*** 1 | ***PO1*** | **10** |
| | | | **UNIT – V** | | | |
| | 7 | a) | Discuss K means clustering algorithm using Euclidean distance and manhattan distance measures. | ***CO*** 2 | ***PO2*** | **10** |
| | | b) | Define Deep Learning and discuss two of its applications. Illustrate a single layer perceptron model. | ***CO*** 2 | ***PO2*** | **10** |

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