USN [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]                              **21AI63**

## Sixth Semester B.E. Degree Examination, June/July 2024
## Machine Learning

Time: 3 hrs.                                                              Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.*

### Module-1

1   a.   Illustrate the basic design issues and approaches to machine learning.    **(08 Marks)**
    b.   What is machine learning? Explain with an example why to use machine learning. **(04 Marks)**
    c.   Explain the main challenges of machine learning that can arise when selecting a learning algorithm and training it on data.    **(08 Marks)**

### OR

2   a.   Discuss the broad categories of machine learning system.    **(10 Marks)**
    b.   Write Find-S algorithm and apply the same for the given instance.

| Location | Price | Size | Condition | Buy_House |
|----------|-------|------|-----------|-----------|
| Urban | Expensive | Large | New | Yes |
| Sub urban | Moderate | Medium | Old | No |
| Urban | Moderate | Small | New | Yes |
| Urban | Moderate | Large | Old | Yes |

**(10 Marks)**

### Module-2

3   a.   Illustrate various methods to prepare the data for machine learning algorithms.    **(10 Marks)**
    b.   Explain multilabel classification and multi output classification with code snippet. **(10 Marks)**

### OR

4   a.   Explain the various performance measure to evaluate a classifier with an example:
         (i)    Measuring accuracy using cross-validation.
         (ii)   Confusion matrix
         (iii)  Precision
         (iv)   Recall
         (v)    The ROC curve.    **(10 Marks)**
    b.   Explain how do you frame the problem and choose an appropriate performance measures for a dataset in a machine learning project.    **(06 Marks)**
    c.   Explain Grid search method to fine-tune the model.    **(04 Marks)**

### Module-3

5   a.   What is gradient descent. Explain various types of gradient descent with necessary diagrams.
                                                                                    **(10 Marks)**
    b.   Show that how SVM make predictions using Quadratic programming and Kernelized SVM.
                                                                                    **(10 Marks)**

**OR**

6  a. Explain the following with respect to logistic regression :
   - (i) Estimating probabilities.
   - (ii) Training and cost functions. **(10 Marks)**
   b. Discuss non-linear SVM classification. How can you use Polynomial Kernal, Gaussian and RBF Kernel? **(10 Marks)**

## Module-4

7  a. Explain how decision trees are trained, visualized and used in making predictions. **(10 Marks)**
   b. Explain Bagging and Pasting with an example. **(10 Marks)**

**OR**

8  a. Explain CART algorithm. Discuss regularization hyper parameters in Decision trees.
   **(10 Marks)**
   b. What is Boosting? Explain AdaBOOSE and gradient Boosting. **(10 Marks)**

## Module-5

9  a. What is Bayes theorem. Describe Brute-force Map learning algorithm. **(08 Marks)**
   b. Discuss the minimum description length algorithm. **(08 Marks)**
   c. Explain the steps of Gibbs algorithm. **(04 Marks)**

**OR**

10 a. Write EM algorithm and explain in details. **(10 Marks)**
   b. Explain Naïve Bayes classifier with an example. **(10 Marks)**

* * * * *