Code No: R2032051 **R20** SET -1

III B. Tech II Semester Regular/Supplementary Examinations, May/June - 2024
MACHINE LEARNING
(Com. To CSE & IT)

Time: 3 hours Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1. a) Write a short note on applications of machine learning to classification problems. [7M]
   b) Explain the following: i) Insufficient Quantity of Training Data ii) Non representative Training Data iii)Poor Quality Data iv) Over fitting and under fitting [7M]

(OR)

2. a) Describe the architecture and functionality of various layers of deep learning networks in detail. [7M]
   b) How do we estimate the risk and loss functions? Explain the role of statistics in it in detail. [7M]

UNIT-II

3. a) Write a note on linear regression. Implement the linear regression to predict the stock market price prediction. [7M]
   b) Explain the working principle of the distance-based model. Give example. [7M]

(OR)

4. a) Write the induction and deduction steps followed in the classification model and explain the basis for training and testing with examples. [7M]
   b) How can decision trees be used to classify the attributes? Explain the algorithm steps. [7M]

UNIT-III

5. a) Discuss the most popular Ensemble methods given. [7M]
      i) Bagging ii) Boosting iii) Stacking
   b) With a neat sketch, explain the marginal planes used in linear SVM classification. [7M]

(OR)

6. a) Write a note on Hard voting classifier predictions. Explain with an example. [7M]
   b) Implement Naïve Bayes classifier to classify the loan application as rejected/accepted based on the history of the customer with a limit on total loan amount of 50000/- Rs. [7M]

UNIT-IV

7. a) How is dimensionality reduction handled by Principal omponent Analysis? Explain in detail. [7M]
   b) Consider an image with multiple objects. Explain the steps to be followed to perform clustering for image segmentation. [7M]

(OR)

8. a) Write a detailed note on a kernel trick that implicitly maps instances into a very high-dimensional space. How do we perform complex nonlinear projections for dimensionality reduction with this? [7M]
   b) Initializing the k- centroids in k-means plays a vital role in yielding better performance by the k-means clustering algorithm. Discuss with example. [7M]

UNIT-V

9. a) Relate Multi-Layer Perceptron and Backpropagation. Describe various activation functions used in it. [7M]

   b) Present an algorithm for Training an MLP. Use Keras for implementation and explanation. [7M]

(OR)

10. Explain the following with an application where a student dataset is considered to predict the grade as Pass/Fail [14M]
    a) Load Data
    b) Define Keras Model
    c) Compile Keras Model
    d) Fit Keras Model
    e) Evaluate Keras Model
    f) Tie It All Together
    g) Make Predictions

Code No: R2032051 **R20** SET -2

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UNIT-I

1. a) Write about various fields that form the basis for Artificial Intelligence. [7M]
   b) What is the significance of using statistical foundations in machine learning? Explain various tradeoffs in statistical learning. [7M]

(OR)

2. a) Write a short note on Supervised and unsupervised machine learning algorithms. [7M]
   b) How sampling distribution of an estimator finds the individual data values distributed over mean, variance and other parameters. Explain in detail. [7M]

UNIT-II

3. a) Differentiate classification and regression problems and their solutions with examples. [7M]
   b) What is a support vector? Explain the importance of maximal margin in support vector machine. [7M]

(OR)

4. Write a note on the following with respect to the decision tree. [14M]
   a) Training and Visualizing a Decision Tree
   b) Making Predictions
   c) Estimating Class Probabilities
   d) The CART Training Algorithm
   e) Computational Complexity

UNIT-III

5. a) What is the training algorithm used when sampling is performed with replacement? Explain its training process and difficulties. [7M]
   b) Differentiate SVM classification with linear and non linear input data sets. [7M]

(OR)

6. a) Explain the working principle of the Random forest algorithm. How do we identify the feature's importance in it? Discuss. [7M]
   b) How will ensemble methods yield better performance than normal learning algorithms? Explain various ensemble learning methods in detail. [7M]

UNIT-IV

7. a) Explain the following dimensionality reduction techniques. [7M]
   Projection and Manifold Learning.
   b) Explain the following with respect to the K-Means clustering algorithm. i) The objective ii) How k-means clustering works iii) Implementation of K-Means Clustering [7M]

(OR)

8. a) Explain the following with respect to principal component analysis: Randomization and Kernel Trick. [7M]
   b) Write a note on Gaussian mixtures. Explain its implementation to identify the clusters from the input data. [7M]

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UNIT-V

9. a) Write a note on the functions of perceptron and its implementation of logical operations. Discuss its limitations. [7M]

   b) How do we install Tensor flow? Explain the steps and detail the libraries used to implement machine learning algorithms. [7M]

(OR)

10. Give the overview of the five steps in the neural network model life-cycle in Keras: Define, Compile, Fit, Evaluate the Network and Make Predictions. [14M]

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All Questions Carry Equal Marks
*****

UNIT-I

1.	a)	Write a short note on fields that contribute to Artificial Intelligence.	[7M]
	b)	How do you estimate the loss and accuracy of the machine learning model? Explain for training and test cases.	[7M]
		(OR)	
2.	a)	Explain the application of machine learning in classification and prediction.	[7M]
	b)	Explain various sampling distribution estimators used in statistical learning.	[7M]

UNIT-II

3.	a)	Explain the working principle of logistic regression. How is it different from linear regression? Give an example.	[7M]
	b)	What is multi-class classification? With MNIST data sets, explain the algorithm.	[7M]
		(OR)	
4.	a)	How do we select the features to be considered as nodes for splitting the decision tree? Explain various measures considered.	[7M]
	b)	What is ranking? How do we determine it? Explain with any classification algorithm.	[7M]

UNIT-III

5.	a)	Explain the following Support Vector Machine models. i) Linearly separable case ii) Linearly inseparable case	[7M]
	b)	Describe the depth of random forests. Does it improve the performance of learning? Explain in detail.	[7M]
		(OR)	
6.	a)	What is the importance of Baye's theorem in Naïve Baye's classification? Explain with an example.	[7M]
	b)	Write a short note on the implementation of SVM regression. How is it different from classification?	[7M]

UNIT-IV

7.	a)	Describe what is The Curse of Dimensionality. Explain the Main Approaches for Dimensionality Reduction.	[7M]
	b)	Can we perform data cleaning and data reduction preprocessing techniques with clustering algorithms? Discuss in detail.	[7M]
		(OR)	
8.	a)	Explain the role of hyperplanes closer to the data sets and projections to down dimensions in principal component analysis.	[7M]
	b)	How to cluster the high dimensional data with density based clustering algorithm? Explain the step-by-step process.	[7M]

UNIT-V

9. a) What are the various structures of artificial neural networks? Explain in detail. [7M]
   b) Write an algorithm to train the multi-layer perceptron. [7M]

(OR)

10. Answer the following [14M]
    a) Define a neural network in Keras
    b) How to compile a Keras model using the efficient numerical backend?
    c) How to train a model on data?
    d) How to evaluate a model on data?
    e) How to make predictions with the model?

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*****

UNIT-I

1. a) What are the challenges encountered in the implementation of machine learning algorithms? [7M]
   b) Write a note on Empirical Risk Minimization. What is its significance in error minimization? [7M]

(OR)

2. a) Describe the following: i) Artificial Intelligence, ii) Machine Learning, iii) Deep Learning. [7M]
   b) What are the concepts of statistics used in machine learning? Explain in detail. [7M]

UNIT-II

3. a) Explain the following [7M]
      i) Linear Regression ii) Non-linear Regression.
   b) Describe the importance of K-Values in nearest neighbour algorithms in detail. [7M]

(OR)

4. a) Support Vector Machines outperform other linear models. Justify this statement. [7M]
   b) Explain the steps to be followed in distance based classification models. [7M]

UNIT-III

5. a) Explain what is boosting , Adaboost and gradient boosting algorithms. [7M]
   b) Describe the working principle of Naïve Baye's algorithm. How does it handle the dependency between attributes of data? Explain. [7M]

(OR)

6. a) Expand the construction of random forests and important parameters to be considered during construction. [7M]
   b) Write the working principle of the voting classifier. Explain its limitations and handle them with other ensemble methods. [7M]

UNIT-IV

7. a) Write a note clustering? Why is clustering considered unsupervised? Explain various clustering techniques in detail. [6M]
   b) i) What is k-means clustering? [8M]
      ii) When to use k-means clustering to analyze data?
      ii) How to implement k-means clustering?
      iii) How to select a meaningful number of clusters?

(OR)

8. a) Write the algorithmic steps to be followed for clustering using the DBSACN algorithm. [7M]
   b) How can you evaluate the performance of a dimensionality reduction algorithm on your dataset? Explain with PCA algorithm. [7M]

UNIT-V

9. a) Explain the biological neuron simulation as an artificial neuron. Describe its architecture and functions. [7M]
   b) Explain the algorithms for perceptron training and fine-tuning of hyperparameters. [7M]

(OR)

10. Build a spam classifier and perform all required operations using Keras. Use the Multi-layer Perceptron algorithm as a predictive model that predicts the email class as spam or ham. [14M]