

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

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

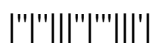
7. a) How is dimensionality reduction handled by Principal component Analysis? Explain in detail. [7M]
- b) Consider an image with multiple objects. Explain the steps to be followed to perform clustering for image segmentation. [7M]

(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



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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? [7M]
Explain various tradeoffs in statistical learning.
- (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

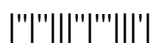
5. a) What is the training algorithm used when sampling is performed with replacement? Explain its training process and difficulties. [7M]
b) Differentiate SVM classification with linear and non linear input data sets. [7M]
- (OR)
6. a) Explain the working principle of the Random forest algorithm. How 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]

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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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? [7M]
Explain for training and test cases.

(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. [7M]
i) Linearly separable case ii) Linearly inseparable case
b) Describe the depth of random forests. Does it improve the performance of learning? Explain in detail. [7M]

(OR)

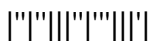
6. a) What is the importance of Baye's theorem in Naïve Baye's classification? Explain with an example. [7M]
b) Write a short note on the implementation of SVM regression. How is it different from classification? [7M]

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 Bayes'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?
iii) How to implement k-means clustering?
iv) How to select a meaningful number of clusters?

(OR)

8. a) Write the algorithmic steps to be followed for clustering using the DBSCAN 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]

