A **Reg. No. :** | | | | | | | | | | | | |

Question Paper Code:U7707

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Professional Elective

Mechanical Engineering

21MEV707 - MACHINE LEARNIG FOR INTELLIGENT SYSTEMS

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The best definition of a hypothesis in machine learning is: CO1-U

   (a) Model (b) Data (c) Assumption (d) Rules

2. Housing prices are predicted using: CO1- U

   (a) Classification (b) Regression (c) Clustering (d) Reinforcement

3. Logistic Regression is used for: CO1- U

   (a) Continuous outcomes (b) Binary classification

   (c) Clustering (d) Dimensionality reduction

4. Linear Discriminant Analysis (LDA) is mainly used for: CO1- U

   (a) Regression (b) Classification

   (c) Clustering (d) Data preprocessing

5. Naïve Bayes algorithm assumes that features are: CO1- U

   (a) Dependent (b) Independent (c) Correlated (d) Continuous

6. Learning Vector Quantization is primarily used for CO1- U

   (a) Classification (b) Regression (c) Clustering (d) Feature selection

7. The Bootstrap method involves: CO1- U

   (a) Sequential sampling (b) Random sampling with replacement

   (c) Stratified sampling (d) Clustering

8. Boosting is characterized by: CO1- U

(a) Parallel training (b) Sequential training

(c) Reducing bias (d) Increasing variance

9. The basic unit of a neural network is called a CO1- U

(a) Neuron (b) Node (c) Layer (d) Activation

10. Convolutional Neural Networks (CNNs) are best suited for CO1- U

(a) Image recognition (b) Sequential data analysis

(c) Text processing (d) Tabular data

PART – B (5 x 2= 10Marks)

11. Summarize the bias-variance tradeoff in machine learning. CO1-U

12. Explain how regularization helps in preventing over fitting. CO1 -U

13. Illustrate how the Naïve Bayes algorithm can be utilized for classifying news articles into categories such as sports, politics, and entertainment. CO2 -App

14. Describe the concept of boosting in ensemble methods. CO1 -U

15. Identify the role of neurons play in an artificial neural network. CO1 -U

PART – C (5 x 16= 80Marks)

16. (a) Apply machine learning to real-world examples, focusing on the data types and algorithms used. CO2 -App (16)

Or

(b) Demonstrate the use of error metrics like accuracy and MSE in model evaluation. CO2 -App (16)

17. (a) Using the following Data Set to find B_0, B_1 and predicted Y values using Linear Regression Algorithm. CO2 -App (16)

X	2	4	6	5	7
Y	1	3	4	3	5

Or

(b) Apply logistic regression to the given dataset, calculate the coefficients, and predict the probability of purchase (Result = 1) for a customer who is 27 years old. CO2 -App (16)

Customer Age (Years)	22	25	28	32	35
Purchased (Result)	0	0	1	1	1

18. (a) A clothing company conducted a survey about the selection of T-shirts, and the survey results are given below. Predict whether a customer will buy or not buy a T-shirt using the Naive Bayes algorithm. CO2 -App (16)

Size	Color	Class
Small	Red	Buy
Medium	Blue	Buy
Large	Red	Not to buy
Small	Red	Buy
Large	Blue	Not to buy
Small	Red	Buy

Or

(b) Apply the K-Nearest Neighbors (KNN) algorithm to predict the Fitness Routine for Emma (Age: 27, Gender: Female). CO2 -App (16)

Person	Years	Sex	Work Type
Adam	24	M	Office
Jane	28	F	Remote
Alex	35	M	Office
Linda	30	F	Hybrid
John	40	M	Remote

19. (a) Determine the Bagged prediction accuracy using Bagged Decision Tree for the following dataset. Use **A = 3** and **B = 2, 4** as split points. CO3 - App (16)

Feature A	Feature B	Target (T)
3	2	0
2	1	0
4	3	1
1	0	0
6	4	1

Or

(b) The following dataset is given for the people's classification using height and weight. Using Bagged Random Forest Tree algorithm to predict the accuracy of the following split data. CO3 - App (16)

Height (cm)	167 169
Weight (kg)	69

Height (cm)	**Weight (kg)**	**Class**
167	51	Under weight
182	62	Normal
176	69	Normal
173	64	Normal
172	65	Normal
174	56	Under weight
169	58	Normal
173	57	Normal
170	55	Normal

20. (a) Execute the training process of a convolutional neural network on a specified dataset, including data preprocessing steps. CO3 - App (16)

Or

(b) Utilize Long Short-Term Memory (LSTM) cells within a recurrent neural network to effectively capture long-range dependencies in sequences. CO3- App (16)