

**BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)**  
**B. Tech. Sem - V COMPUTER SCIENCE & ENGINEERING AI&ML :**  
**SUMMER : 2024**  
**SUBJECT: MACHINE LEARNING**

Day : Wednesday  
Date : 08/05/2024

S-23958-2024

Time : 10:00 AM-01:00 PM  
Max. Marks : 60

**N.B.**

- 1) All questions are **COMPULSORY**.
- 2) Figures to the **RIGHT** indicate **FULL** marks.
- 3) Assume suitable data **WHEREVER** necessary.
- 4) Draw neat diagrams **WHEREVER** necessary.

Q.1 What is DIKW pyramid and explain in details. (10)

**OR**

Q.1 Explain supervised learning, Unsupervised learning, and reinforcement learning. (10)  
Provide examples of each.

Q.2 A clinical trial gave the following data for BMI and Cholesterol level for 10 patients. (10)  
Predict the likely value of cholesterol level for someone who has a BMI of 27.

BMI	Cholesterol
17	140
21	189
24	210
28	240
14	130
16	100
19	135
22	166
15	130
18	170

**OR**

Q.2 Consider following table for binary classification: Calculate the root of the decision tree using Gini index (10)

Sr. No.	Customer Income	Gender	Car Type	Class
1	High	M	Family	C1
2	High	M	Sports	C1
3	High	M	Family	C2
4	Low	M	Family	C2
5	Low	F	Family	C2
6	Low	F	Sports	C1
7	Low	F	Sports	C2
8	High	M	Family	C1
9	High	F	Family	C2
10	High	F	Family	C2
11	High	F	Sports	C2
12	Low	M	Sports	C2
13	Low	F	Family	C2
14	Low	M	Sports	C1

P.T.O.

Q.3 Explain how k-fold cross-validation helps to estimate the performance of a model on unseen data. (10)

OR

Q.3 Describe the Random Forest algorithm and how it incorporates bagging to improve predictive performance. (10)

Q.4 Explain the concept of quadratic programming and its relevance to solving SVM optimization problems. (10)

OR

Q.4 What is Support Vector Regression (SVR) and how does it differ from SVM for classification? (10)

Q.5 Discuss the role of graph theory concepts such as nodes, edges, and weights in graph-based clustering algorithms. (10)

OR

Q.5 Use the following data and group them using K-means clustering algorithm. Show calculation of centroids. (10)

Height	Weight
185	72
170	56
168	60
179	68
182	72
188	77
180	71
180	70
183	84
180	88
180	67
177	76

Q.6 Describe the main categories of dimensionality reduction techniques and provide examples of each. (10)

OR

Q.6 Explain the mathematical formulation of SVD and its significance in dimensionality reduction. Carry out SVD on. (10)

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