

**School of Computing Science and Engineering**

Department of: Computer Science and Engineering

Assignment-2, Session: 2026-2027

[Programme: B.Tech. CSE] [Semester: VII]

Course Title: Machine Learning

Course Code: CSE473

Max Marks: 20

Instructions:

1. All questions are compulsory
2. Assume missing data suitably, if any
3. All questions should be of higher learning.

BTL Level
(K)

Unit 3

CO3: Construct and apply appropriate mathematical and computational models to develop sustainable and data-driven solutions.

Unit 4

CO4: Analyze and implement feature engineering techniques to extract meaningful patterns and hierarchical structures from complex datasets.

Unit 5

CO5: Evaluate the performance and generalization ability of Machine Learning algorithms to predict and interpret emerging real-world trends.

CO6: Justify the use of Machine Learning approaches for developing sustainable solutions while demonstrating professional and ethical responsibility.

Q.No.**Section A (3×4=12 Marks)****Unit****COs****K**

1

Explain the concept of soft and hard-margin in SVM. Also, for an SVM with $w = (3, 4)$, compute $\|w\|$ and the margin width $2/\|w\|$. Repeat for $w = (0.6, 0.8)$

Unit 3

CO1

K1

2

A cluster contains the points (2, 4), (4, 6) and (6, 8). Compute the centroid and the cluster's contribution to the SSE.

Unit 4

CO1

K2

3

A classifier gives TP = 45, FN = 15, FP = 25, TN = 415. Compute the accuracy, precision, recall and F1 score.

Unit 5

CO2

K1

Section B (1×8=8 Marks)

5

For the points A(2,2), B(3,3), C(8,8), D(9,9), E(2,4) with initial centroids $\mu_1 = (2, 2)$ and $\mu_2 = (8, 8)$:

(a) Assign every point to its nearest centroid, showing the distances.

(b) Compute the updated centroids.

(c) Compute the distortion J after the update.

Unit 4

CO1

K2