**Newton School
of Technology**

Support Vector Machine Worksheet

Name: _____ **Roll Number:** _____

Date: _____

Instructions

Answer concisely and clearly. Show calculations where required. Diagrams may be used.

Questions

1. What is the objective of a Support Vector Machine? Why does SVM focus on margin instead of minimizing training error?

2. What happens to the margin and misclassification when the value of C is increased significantly?

3. What happens when the value of C is very small? In which situations can this be beneficial?

4. An SVM model produces a very narrow margin on the training data. What does this indicate about the model's complexity and generalization?

5. Why can a hard-margin SVM fail completely when even a single outlier is present?

6. Consider a dataset that is not linearly separable in its original feature space. How does SVM still manage to construct a linear decision boundary?

7. If an RBF kernel performs much better than a linear kernel on a dataset, what can you infer about the structure of the data?

8. What is the effect of the RBF kernel parameter γ when it is:

    (a) Very large

    (b) Very small

9. Why can a very high value of γ lead to overfitting even if training accuracy is high?

10. Consider the following hyperplane:

$$w^T x + b = 0$$

What does the magnitude of w indicate about the margin of the classifier?

11. Given two SVM models trained on the same data:

   - Model A has a larger margin and slightly lower training accuracy.
   - Model B has a smaller margin and perfect training accuracy.

   Which model would you prefer and why?

12. A dataset has 1,000 features but only 200 training samples. Why is SVM often a suitable choice in such a scenario?

13. Consider a binary classification problem where only a few data points lie close to the decision boundary. Why do changes in distant points usually not affect the SVM decision boundary?

14. A trained SVM model uses only a small subset of training points for prediction. What does this indicate about the model and its efficiency?

Interview-Focused Questions on SVM

1. Why does SVM maximize margin instead of minimizing classification error directly?

2. How do C and γ together control the bias–variance tradeoff in SVM?

3. Why is SVM sensitive to feature scaling? What happens if features are not scaled?

4. Can SVM output probabilities? If not directly, how are probabilities usually obtained?

5. Why does SVM rely only on support vectors during prediction?

6. When would you prefer a linear SVM over an RBF SVM in practice?

7. Why can SVM training become slow on very large datasets?

8. What are the main limitations of SVM in real-world applications?

— **End of Worksheet** —