INDIAN STATISTICAL INSTITUTE

(Pattern Recognition)

Final SEMESTER EXAMINATION

(MS-QR, SQC)

Duration: 180 minutes

Maximum Marks: 50

[1] Define the positive definiteness of a matrix [1]
[2] What is orthonormal vector? [1]

ANSWER ANY SIX

[3] In a database of 30 samples, 20 samples belong to DOG category and 10 samples belong to CAT category. The model M classifies 15 DOGs and 8 CATs correctly. Develop the confusion matrix and find the Sensitivity and specificity of the model. [4+2+2]

[4] List out the significance of principal component analysis. Describe the whole process of finding principal components with equations. [3+5]

[5] Write the K-means and DBSCAN pattern recognition algorithms. Discuss their advantages and disadvantages over each other. [3+3+2]

[6] Derive the Bayes decision rule for designing model. Make a note of their advantages and disadvantages. [4+4]

[7] (a) Explain generalization and over-fitting aspects using figures? Discuss the effects of these factors in pattern classification problems. [4]

(b) Explain Mahalanobis distance function with their advantages and disadvantages [4]

[8] [4+4]
   a. What is clustering and its mathematical properties in PR?
   b. Describe three different common issues in clustering task.

[9] [4+4]
   a. What is ROC curve? Interpretation it with their significance.
   b. Write short note on data cross validation.

[10] Describe the step by step operations of the pattern recognition principle with diagram. [8]