

FAROOK COLLEGE (AUTONOMOUS), KOZHIKODE

Fourth Semester M.Sc Statistics Degree Examination, April 2025

MST4C13 – Multivariate Analysis

(2022 Admission onwards)

Time: 3 hours

Max. Weightage : 30

PART A

Answer any four questions (weightage 2 for each question)

1. Derive the characteristic of the Wishart distribution and hence show that it is a matrix variate generalization of the χ^2 distribution.
2. Define canonical variates and canonical test.
3. Describe sphericity test.
4. Discuss the procedure of likelihood ratio test.
5. Define orthogonal factor model.
6. Explain the classification problem with a suitable example.
7. Suppose $X, Y \sim BN(\mu_1; \mu_2; \sigma_1; \sigma_2; \rho)$. Show that if $\rho = 0$, then X and Y are independent. Is the converse true?

(2 x 4=8 weightages)

PART B

Answer any four questions (weightage 3 for each question)

8. Obtain the MLE of μ and Σ , when sampling from multivariate Normal population with parameters μ and Σ .
9. Derive Hotelling's T^2 statistics for the one-sample case and explain its properties.
10. Principal components are used for dimension reduction. Explain.
11. Formulate the classification problem as a special case of a statistical decision problem.
12. Describe multivariate Fisher-Behren problem.
13. Derive the null distribution of the multiple correlation coefficient.
14. If $X = X_1, X_2, \dots, X_N$ is a random sample of size N from $N_p(\mu, \Sigma)$, then obtain the distribution of sample mean.

(3x 4=12 weightages)

PART C

Answer any two questions (weightage 5 for each question)

15. Explain different clustering methods employed in multivariate analysis.
16. Obtain likelihood ratio criterion for testing the independence of sub vectors of a multivariate normal vector. Discuss its invariance property
17. What are principal components? How are they associated with eigen values and eigen vectors?
18. What is generalised variance? Derive its distribution.

(5x2=10 weightages)

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Fourth Semester M.Sc Statistics Degree Examination, April 2025

MST4E23 – Applied Algorithms and Analysis fo Multi Type and Big Data

(2022 Admission onwards)

Time: 3 hours

Max. Weightage : 30

Part A**Answer any four questions. Each questions carries 2 weightage.**

1. Define hyperplane in classification
2. What is the role of support vectors in a Maximal Margin Classifier?
3. What is turning parameter (C) in the Support Vector Classifier?
4. Wite any three characteristics of Big Data.
5. What is descriptive analytics, and how is it used?
6. Explain aggregate and disaggregate analysis.
7. What is a perceptual map in MDS?

Part B**Answer any four questions. Each questions carries 3 weightage.**

8. What are the two main steps of the EM algorithm?
9. List any two commonly used kernel functions and their significance in SVMs.
10. What is the Maximal Margin Classifier?
11. What are the four main types of data analytics?
12. Why is metadata important in Big Data Analytics?
13. What is the difference between metric and non-metric MDS?
14. How does MDS help in brand positioning?

Part C**Answer any two questions. Each questions carries 5 weightage.**

15. Why is the EM algorithm called a Maximization–Maximization procedure?
16. Explain how do SVMs handle non-linearly separable data?
17. What are the stagesof the Big Data Analytics Life Cycle?
18. Explain the the decision framework for perceptual mapping