ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU -27
B. Sc – V SEMESTER
SEMESTER EXAMINATION: OCTOBER 2023
(Examination conducted in December 2023)
ST 5223: Matrix Algebra and Linear Regression

Time: 2 Hours   **Max Marks: 60**

This paper contains ONE printed page and THREE parts.

PART-A

I   **Answer any FIVE from the following**   **3 * 5 = 15**

1. Define: i) vector space ii) sub-space iii) trace of a matrix.

2. What is linear independence of a vector? Give an example.

3. State Cayley-Hamilton Theorem.

4. Write a model and assumptions under simple linear regression.

5. Define coefficient of determination and its interpretation.

6. Explain Forward selection method.

7. How do we identify the presence of heteroscedasticity explain?

PART - B

II   **Answer any FIVE from the following**   **5 * 5 = 25**

8. Define Hessenberg matrix with an example. State rank nullity theorem.

9. State and prove rank multiplicity Theorem.

10. Explain the statistical test procedure for testing the significance of regression and on individual regression coefficients.

11. Discuss prediction of new observations.

12. What is residual analysis? Write a brief note on a normal Q-Q plot.

13. Explain any two tests to detect multicollinearity.

14. Describe logistic regression.

PART - C

III   **Answer any TWO from the following**   **10 * 2 = 20**

15. Define: i) Quadratic form and Canonical form.

      ii) Orthogonal reduction of quadratic forms.

      iii) Inner product & Orthogonal vector.   (3+4+3)

16. Explain multiple linear regression model with an example. Discuss estimation of parameters in multiple linear regression models.

17. Define autocorrelation. Describe Durbin Watson test for autocorrelation.

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