

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)

(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)

Chromepet, Chennai - 600 044.

B.Sc.Statistics - END SEMESTER EXAMINATIONS - APRIL 2025

SEMESTER - V

20USTCT5011 - Regression Analysis

Total Duration : 2 Hrs.30 Mins.

Total Marks : 60

Section B

Answer any **SIX** questions ($6 \times 5 = 30$ Marks)

1. State and explain the properties of multiple correlation coefficients.
2. Prove that the partial correlation coefficient remains unchanged under a linear transformation of the variables.
3. Assess the importance of residual diagnostics in regression analysis.
How can residual plots help in validating model assumptions?
4. Derive the least squares estimators for the parameters in a simple linear regression model.
5. Explain in detail the methods of detecting outliers.
6. Define homoscedasticity. How does the presence of heteroscedasticity affect regression analysis?
7. Explain the concept of Generalized Least Squares (GLS) and its advantages over Ordinary Least Squares (OLS).
8. Briefly discuss the ANOVA approach for testing the significance of regression coefficients in a linear regression model.

Section C

Answer any **THREE** questions ($3 \times 10 = 30$ Marks)

9. Derive the relationship among simple, multiple, and partial correlation coefficients in a three-variable case. Also explain how partial correlation differs from multiple correlation.
10. (i) Show that the least squares estimators of the regression coefficients in simple linear regression are unbiased. (6 Marks)
(ii) Derive the variance of the least squares estimators. (4 Marks)
11. Explain the different types of transformations used in modelling.

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12. Explain 'Generalized Least Squares' and discuss the estimation of the regression parameters and ANOVA.
13. (i) Explain the assumptions about the explanatory variables in a Generalized Linear Model (GLM). (4 Marks)
- (ii) Derive the likelihood ratio test for testing whether a subset of regression coefficients in a linear model equals zero. (6 Marks)
