LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **STATISTICS**

FIFTH SEMESTER – **APRIL 2023**

UST 5503 – REGRESSION ANALYSIS

Date: 05-05-2023 Dept. No. Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

PART - A

Answer ALL the questions. **10 X 2 = 20**

1. Define slope and intercept of regression analysis.
2. Explain MAPE in simple linear regression model.
3. Define coefficient of Determination.
4. State the objectives of model adequacy checking.
5. Explain multiple linear regression model.
6. Write the expression for the estimator of the error term in multiple linear regression model with r explanatory variables.
7. Bring out the need for dummy variables in regression analysis.
8. What is an outlier?
9. Define multicollinearity.
10. Explain variance inflation factor.

PART - B

Answer Any FIVE questions. **5 X 8 = 40**

11. Write the procedure for testing slope and intercept estimators in simple linear regression model.
12. Explain Anderson Darling test for residuals.
13. Show that in multiple linear regression model $\hat{\beta} = (X'X)^{-1}X'Y$
14. Discuss the effect of outliers in regression model.
15. Describe standardized residual and studentized residual.
16. Write a note on weighted least squares.
17. The following data shows the experience of machine operators and their performance ratings as given by the number of good parts turned out per 100 pieces:

Operator	1	2	3	4	5	6	7	8
Experience (in months)	16	12	18	4	3	10	5	12
Performance ratings	87	88	89	68	78	80	75	83

Fit a regression model to the data.

18. Complete the ANOVA table for the regression model of three independent variables with the sample size 28

Source of variation	Degrees of freedom	Sum of squares	Mean sum of squares	F ratio
Regression	-	-	-	170.918
Residual	-	242.30	-	
Total	-	-		

PART - C

Answer Any TWO questions. **2 X 20 = 40**

19. a) Show that least square estimators of simple linear regression model are BLUE. **(10)**

    b) Obtain the unbiased estimator of error term in simple linear regression model**.** **(10)**

20. a) Explain residual plots **(10)**

    b) Write a note on Kolmogrov-Smirnov test for residuals. **(10)**

21. a) Write the test procedure for testing the subset of regression coefficients equal to zero **(10)**

    b) Discuss the effect of multicolliearity. **(10)**

22. Find MAE and MAPE for the following data:

Year	2005	2006	2007	2008	2009	2010	2011	2012
Advertisement Expenditure (Rs '000)	12	15	15	23	24	38	42	48
Sales (Rs lakh)	5.0	5.6	5.8	7.0	7.2	8.8	9.2	9.5

(20)

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