RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FOURTH SEMESTER EXAMINATION, MAY 2023

SECOND YEAR [BATCH 2021-24]

Date : 23/05/2023 **ECONOMICS [Honours]**

Time : 11 am – 1 pm **Paper : CC8** Full Marks : 50

Answer **any five** from the following questions: **[5×10]**

1. a) State and explain the reasons behind having a random error component in a simple linear regression model.
   b) State and explain the assumptions of Classical Linear regression model.
   c) Specify the set of assumption(s) required for estimation and hypothesis testing. [4+5+1]

2. a) Explain why the coefficient of determination (R^2) (in case of linear regression with intercept) increases with the increase of the number of regressors?
   b) Explain why you can not use Conventional R^2 in case of linear regression model without intercept? [5+5]

3. a) You obtained the following regression result:
   $Y_i = 50 - 20\, x_i, \quad R^2 = 0.5$
   (2)
   The figure in the bracket is the standard error. Find out the sample size (n) underlying the result.
   b) Prove that the coefficient of determination in case of simple linear regression (with intercept) is the square of correlation coefficient between dependent and independent variable. [5+5]

4. a) Explain the concept of autocorrelation.
   b) Explain the Durbin-Watson test for detecting autocorrelation in a regression model.
   c) State the limitations of the Durbin-Watson test. [2+5+3]

5. a) Explain the concept of heteroscedasticity.
   b) State the consequence of heteroscedasticity in a simple linear regression model.
   c) Explain two different methods to detect the presence of heteroscedasticity in a regression model. [2+2+6]

6. a) In the regression model $y_i = \alpha + \beta x_i + u_i$, if the sample mean $\bar{x}$ is zero, show that $\text{cov}\left(\hat{\alpha}, \hat{\beta}\right) = 0$, where $\hat{\alpha}$ & $\hat{\beta}$ are the least square estimators of α & β.
   b) Given a sample of 50 observations and 4 explanatory variables, what can you say about the auto-correlation if the computed Durbin-Watson 'd' values are
   i) $d = 1.05$ ii) $d = 1.40$ iii) $d = 2.5$ iv) $d = 3.97$
   [Given $d_L = 1.378$, $d_u = 1.721$ for 50 observation and 4 explanatory variables] [6+4]

7. In the simple linear regression with intercept, show that the OLS estimator of the slope coefficient is BLUE. [10]

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