

2020

STATISTICS — GENERAL

Paper : DSE-A-1

(Econometrics)

Full Marks : 50

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Day 2

1. Answer **any ten** from the following :

1×10

- (a) What is an econometric model?
- (b) Mention any one property of the ordinary least squares (OLS) estimators.
- (c) What are the assumptions on the error term in a regression model?
- (d) Write down the expression for R^2 .
- (e) What will happen to the OLS estimator if heteroscedasticity is present in a regression model but ignored?
- (f) Write down a plausible approach of dealing with a model that exhibits heteroscedasticity.
- (g) What does an alternating pattern in the residuals indicate?
- (h) Write 'True' or 'False' : 'Multicollinearity is essentially a sample phenomenon'.
- (i) Write down a symptom of multicollinearity in a regression model.
- (j) Indicate a way of removing multicollinearity from the model.
- (k) What is meant by errors in variables?
- (l) Is it possible to consider the lagged explanatory variable as the instrumental variable?
- (m) How can we take care of measurement errors in the dependent variable?
- (n) Why does serial correlation occur?
- (o) What is meant by spatial auto-correlation?

2. Answer **any four** from the following :

5×4

- (a) Discuss the methodology of econometrics giving a suitable example.
- (b) What is meant by heteroscedasticity? Draw rough sketches showing homoscedastic disturbances and the various forms of heteroscedastic disturbances.

Please Turn Over

- (c) Derive the mean and the variance of the auto-correlated disturbance term in case of first order auto-regressive process.
- (d) What is dummy variable? Explain the uses of dummy variables in regression analysis.
- (e) What do you mean by multicollinearity? Discuss the factors which give rise to the problem of multicollinearity.
- (f) Write a short note on instrumental variables.

3. Answer **any two** from the following :

- (a) Given the linear model $y_i = \beta_1 + \beta_2 x_i + u_i$, where $\text{Var}(u_i) = \sigma^2 x_i$ for $i = 1, 2, \dots, n$. Show how this model can be transformed so that the disturbances have constant variance. Explain how you would obtain the estimates of β_1 and β_2 from the transformed model. 3+7
 - (b) Briefly explain the Durbin-Watson test for detecting the problem of auto-correlation. What are its limitations? 8+2
 - (c) Briefly explain the different methods of diagnosing the problem of multicollinearity. 10
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