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.

(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 Var $(u_i) = \sigma^2 x_i$ for $i = 1, 2, ..., n$. 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
