# 2020

## ECONOMICS — HONOURS

**Paper : DSE-A-1**

**(Applied 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.*

### Group - A

**1.** Answer ***any five*** questions : 2×5

(a) Mention the basic steps in formulating an econometric model.

(b) What is a white-noise process?

(c) Consider the regression equation,

$y = \alpha + \beta_1 x_1 + \beta_2 x_2 + u$

where $x_1$ and $x_2$ are connected by $x_1 + 3x_2 = 6$. Do you face any problem in estimating the parameters of the model?

(d) What is a stationary time series?

(e) Mention two procedures for de-trending any non-stationary time series.

(f) What is meant by 'cross-validation' technique in model selection?

(g) For the use of panel data, consider the following fixed effect model—

$$Y_{it} = \beta_0 + \beta_1 x_{it1} + \beta_2 x_{it2} + a_i + u_{it}$$

where $a_i$ = unobserved effect. $t = 1, 2,...T$

$i = 1, 2,...N$

Under what assumption the above model becomes a random-effect model?

(h) Assume that $y = f(x_1, x_2)$; such that the stochastic relationship between the variables can be denoted by $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + u$; where $u$ is the error or disturbance term. Mention any two reasons for the inclusion of the error term in the relationship.

### Group - B

**2.** Answer ***any two*** questions : 5×2

(a) Consider the following model for the demand of a particular product $z$ –

$$\ln Q_z = \beta_0 + \beta_1 \ln P_z + \beta_2 \ln P_j + \beta_3 \ln Y + u$$

where $Q_z \rightarrow$ demand for commodity $z$

$P_z \rightarrow$ price of commodity $z$

$P_j \rightarrow$ price of a related product $j$

$y \rightarrow$ disposable income.

Based on a-priori theoretical knowledge, how does a researcher expect about the sign and the size of the estimates of parameters?

(b) Write a short note on the use of dummy variables in deseasonalization of time series data.

(c) For 50 people, the demand equation for tea has been estimated by the following :

$$\hat{y} = 3{\cdot}22 - {\cdot}45x_1 + 0{\cdot}67x_2$$
$$(2{\cdot}02) \quad (0{\cdot}42) \quad (0{\cdot}25)$$

[figures in parentheses are standard errors]

where, $y$ = log tea demand

$x_1$ = log price of tea

$x_2$ = log disposable income.

Compute the partial correlation coefficients and interpret them.

(d) Theory of consumer behaviour proposes that the demand for car ($Q_D$) depends on the price of petroleum ($P_1$) and diesel ($P_2$). You want to test this proposition empirically. What econometric model would you propose and what are the assumptions that you would make so as to apply the classical normal linear regression method to estimate your proposed model?

## Group - C

**3.** Answer ***any three*** questions.

(a) (i) What is meant by 'measurement error' in an econometric model?

(ii) What are the consequences on OLS estimators under measurement error? 10

(b) Explain Ramsey's RESET test on functional misspecification of an econometric model. 10

(c) Find the consequences on the OLS estimators of slope parameters in the misspecified model –

(i) The true model : $y = \beta_1 x_1 + \beta_2 x_2 + u$

The misspecified model : $y = \beta_1 x_1 + e$

(ii) The true model : $y = \beta_1 x_1 + u$

The misspecified model : $y = \beta_1 x_1 + \beta_2 x_2 + v$ 5+5

(d) The following represents the marks obtained by 10 students in Mathematical Economics in mid-term, selection and final examination. Find the regression equation of final examination marks on mid-term and selection marks.

| **Sl no.** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** |
|---|---|---|---|---|---|---|---|---|---|---|
| Marks in final ($x_1$) | 32 | 50 | 22 | 38 | 42 | 28 | 35 | 44 | 30 | 21 |
| Marks in mid-term ($x_2$) | 35 | 40 | 22 | 18 | 32 | 27 | 45 | 47 | 38 | 20 |
| Marks in selection ($x_3$) | 30 | 43 | 25 | 20 | 36 | 21 | 37 | 41 | 34 | 23 |

10

(e) Fit a straight line trend to the following figures of production of a cement factory and estimate how much cement will be produced in the factory in the year 2021.

| **Year** | **2013** | **2014** | **2015** | **2016** | **2017** | **2018** |
|---|---|---|---|---|---|---|
| Production (1000 tonnes) | 75 | 83 | 109 | 129 | 134 | 148 |

8+2

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