

2024

ECONOMICS — HONOURS

Paper : DSE-A-1 and DSE-A-2

*The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.*

Paper : DSE-A-1

(Applied Econometrics)

Full Marks : 50

Group - A

1. Answer *any five* questions :

- (a) Distinguish between cross-section data and time series data with suitable example for each. 2
- (b) Using observations for 150 families on annual income (Y) and consumption (C) (both in terms of rupees), the following equation is estimated :

$$\hat{C} = 124.84 + 0.853Y$$

Obtain the estimated value of m.p.s. and a.p.s. when the family income is ₹ 30,000. 1+1

- (c) Given the data on Y and X , explain how you will estimate the parameters in the following model by using OLS : 2

(i) $Y = \alpha + \beta \log X$

(ii) $Y = \frac{X}{(\alpha X - \beta)}$

- (d) Consider

$$Y_i = \beta_0 + \beta_1 X_i + u_i$$

'If one is interested in β_1 , then more variability in the independent variable X is preferred.'—
Do you agree?— Explain. 2

- (e) Given the following estimated equation — 2

$$\hat{Y}_i = 5.53 - 5.58X_{1i} + 2.84X_{2i},$$

where $n = 55$ and $R^2 = 0.80$.

Find

- (i) the degrees of freedom, and
(ii) \bar{R}^2 .

Please Turn Over

(0486+0487)

- (f) For an estimated model (Y as the explained variable), the following results are given :

$$\sum Y^2 = 6890; \bar{Y} = 20; n = 15 \text{ and } R^2 = 0.65.$$

Find

- (i) Total sum of squares (TSS), and
 - (ii) Residual sum of squares (RSS).
- (g) Consider the following classical linear regression model given by

$$Y_i = \beta_1 + \beta_2 X_i + u_i,$$

where Y represents weekly family consumption expenditure and X stands for weekly family income. Which of the usual assumptions of CLRM would you like to change to incorporate the fact that there is more variability in the consumption expenditure of the richer families compared to the poorer families? What is this situation known as?

- (h) What is a white noise process?

Group - B

2. Answer *any two* questions :

- (a) Consider the following transformed model :

$$\ln Q_x = \beta_0 + \beta_1 \ln P_x + \beta_2 \ln M + u,$$

where Q_x = Demand for commodity X

P_x = Price of commodity X

M = Consumer's money income.

- (i) Interpret the parameters β_1 and β_2 and based on a-priori theoretical knowledge, comment on the sign of parameter estimates.
 - (ii) Write down the original form (before transformation) of the above model.
 - (iii) Given the fact that the consumer is free from 'money-illusion'. What restrictions would you like to put on β_1 and β_2 ? Explain your answer.
- (b) For a given data set, the plot reveals that the explained variable (Y) increases faster than the explanatory variable (X).

Researcher 1 uses a possible functional form of the model as $Y = Ae^{\beta X}$,

while another researcher uses $Y = AX^\beta$.

- (i) Do you have linear regression model in both cases?— Explain.
- (ii) What does β measure in each case?
- (iii) Which form is preferred in empirical work and why?

- (c) In a study relating to college grade Point (gPA) Average to time (number of hours) spent per day in studying and leisure (any activity is put into one of the two categories), the following model is proposed —

$$\text{gPA} = \beta_0 + \beta_1 \text{ study} + \beta_2 \text{ leisure} + u.$$

- (i) Does this model violate any of the usual assumptions of CLRM?
 (ii) Do you face any problem in estimating the parameters of the model?— If yes, why? 2+3
 (d) (i) What are stationary time series data?
 (ii) Consider

$$X_t = X_{t-1} + \epsilon_t,$$

where $\{\epsilon_t\}$ is a purely random series with mean = μ ; variance = σ^2 and

$$\text{Cov}(\epsilon_t, \epsilon_{t+k}) = 0 \quad \forall k \neq 0.$$

Given that $X_0 = 0$, examine the stationarity of the above model and comment on its predictive power. 2+2+1

Group - C

3. Answer *any three* questions :

- (a) From the survey data on 32 firms, the following regression equation is estimated :

$$\log^{\wedge}(\text{RD}) = -4.38 + 1.084 \log(\text{Sales}) + 0.0217(\text{Pfmg})$$

(0.47) (0.06) (0.0128)

$R^2 = .918$ [figures in parenthesis are standard errors]

where RD = annual R & D spending (in rupees) by the firm.

Sales = annual sales of the firm.

Pfmg = profit margin (profits as percentage of sales).

- (i) Interpret the coefficient of $\log(\text{Sales})$ and (Pfmg) .
 (ii) Find the 95% confidence interval for the population parameter $\beta(\text{Sales})$
 (iii) Test the hypothesis that keeping sales constant, (Pfmg) has no influence on R & D spending at 5% level of significance.
 (iv) What is the over all significance of the slope coefficients at the 5% level of significance?

$$\left[\begin{array}{l} \text{Given : } t_{.025, 29} = 2.045 \\ F_{0.05}(2, 29) = 3.33 \end{array} \right]$$

3+2+2+3

Please Turn Over

- (b) (i) In the context of the following multiple linear regression model :

$$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + u_i,$$

distinguish between simple correlation coefficient and partial correlation coefficient.

- (ii) Interpret the following data :

$$r_{y_1}^2 = 0.95 \text{ and } r_{y_2}^2 = 0.96$$

$$\text{But } r_{y_{1.2}}^2 = 0.1 \text{ and } r_{y_{2.1}}^2 = 0.1$$

- (iii) Based on data for 23 firms, the following estimated model is obtained :

$$\hat{Q} = 4 + 0.7L + 0.2K \quad R^2 = 0.86$$

(0.78) (0.102) (0.102)

(figures in parenthesis are standard errors)

where Q = log output

L = log labour input

K = log capital input

Compute the partial correlation coefficient $r_{QL \cdot K}^2$.

4+3+3

- (c) (i) Mention the types of specification errors usually committed in developing an econometric model.
- (ii) Consider the following cases—

Case I $Y_i = \beta_1 + \beta_2 X_{2i} + \beta_3 X_{3i} + u_i, \dots$ True model

$Y_i = \alpha_1 + \alpha_2 X_{2i} + v_i, \dots$ Fitted model

Case II $Y_i = \beta_1 + \beta_2 X_{2i} + u_i, \dots$ True model

$Y_i = \alpha_1 + \alpha_2 X_{2i} + \alpha_3 X_{3i} + v_i, \dots$ Fitted model.

Mention the 'unbiased' and 'consistency' property of the OLS estimate of the parameters in the 'fitted' model for the two cases.

How does the correlation between X_2 and X_3 affect the variance of the estimated coefficient ($\hat{\alpha}_2$) in both cases?

3+3+4

(d) From a data for 3,877 observations following regression results are obtained :

	Coefficient	<i>t</i> -stat	<i>p</i> -value
Constant	79.50	1.572	0.276
Age	8.23	3.789	0.000
Sex	-1.07	4.078	0.000

Dependent variable wage, $\bar{R}^2 = 0.787$.

- (i) Are the coefficients of age and sex individually significant? [Conclude on the basis of *p*-value]
- (ii) Suppose '1' is for male and '2' is for female for the variable sex. State whether the female workers are getting higher wage than male workers.
- (iii) Suppose one get the results of the above regression as follows :

	Coefficient	<i>t</i> -state	<i>p</i> -value
Constant	65.02	1.027	0.352
Age	5.26	0.549	0.478
Sex	-0.87	1.321	0.125

Dependent variable *i*, wage, $R^2 = 0.89$.

Identify the problem in the regression. Give one remedial measure of this problem. 3+3+4

- (e) (i) What is meant by 'trend' in a time series?
- (ii) Fit a linear trend to the following figures of steel production in a factory and find the estimated amount of steel to be produced in the factory in 2027.

Year	2018	2019	2020	2021	2022	2023
Steel Production (in '000 tonnes)	75	83	109	129	134	148

2+6+2

Paper : DSE-A-2
[Economic History of India (1857-1947)]
Full Marks : 65

Group - A

1. Answer *any ten* questions :

2×10

- (a) Mention any two features of the New Guarantee System.
- (b) What were the factors responsible for the origin of the Managing Agency System in India?
- (c) What are 'Home Charges'?
- (d) What is Mahalwari System?
- (e) What is de-industrialization?
- (f) What is preferential tariff?
- (g) How did the U.S. Civil War contribute to the commercialization of agriculture in India?
- (h) Mention two arguments given by the Critics of Drain Theory.
- (i) What was the Sterling Exchange Standard of 1931-47?
- (j) Mention two functions of the Managing Agents.
- (k) Mention two criticisms against the Ryotwari System.
- (l) Do you think that the Old Guarantee System was wasteful?
- (m) Name two industries that India possessed in the Late 19th century.
- (n) Mention two reasons that led to the move towards protective trade after World War I.
- (o) Name two Managing Agency Houses during the British period.

Group - B

2. Answer *any three* questions from the following :

5×3

- (a) Mention the factors responsible for de-industrialization in India during the British rule.
- (b) What were the land revenue arrangements under Permanent Settlement?
- (c) What are the implications of 'imperial preference' in foreign trade?
- (d) What were the criticisms against the railways rates policy during the British rule?
- (e) What was the 'Ratio-Controversy' originating from the recommendations of the Hilton Young Commission?

Group - C

3. Answer *any three* questions from the following :

- (a) Discuss the causes and impacts of commercialization of Indian agriculture during the 19th century. 10
 - (b) Discuss the role of the Managing Agency System in the development of India's industries. 10
 - (c) Critically discuss the Drain Theory in the context of India's economic history. 10
 - (d) What was the Gold Exchange Standard as currency system of India? Did it help India? Why did this currency system break down in 1917? 4+2+4
 - (e) Do you agree with the view that the railway building in India brought 'limited economic development'? 10
-