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5 SEM TDC DSE STS (CBCS) 3 (H) (N/O)

2 0 2 5

(Nov/Dec)

STATISTICS

(Discipline Specific Elective)

(For Honours)

Paper : DSE-3

(**Econometrics**)

*The figures in the margin indicate full marks
for the questions*

(New Course)

Full Marks : 55

Pass Marks : 22

Time : 3 hours

1. Choose the correct answer from the following : 1×5=5

(a) BLUE is

(i) Best Linear Unbiased Estimator

(ii) Best Linear Unconditional
Estimator

(2)

- (iii) Basic Linear Unconditional Estimator
- (iv) None of the above
- (b) In general linear model, $E(UU') =$
- (i) $\sigma_u^2 I$
- (ii) σ_u^2
- (iii) I
- (iv) None of the above
- (c) Multicollinearity is used to denote
- (i) the presence of linear relationship among explanatory variables
- (ii) the presence of non-linear relationship among explanatory variables
- (iii) the presence of linear relationship among dependent variables
- (iv) the presence of linear relationship among endogenous variables

(3)

- (d) Multicollinearity can be detected if the regression function has
- (i) high R^2 but few significant t -test ratio
- (ii) low R^2 but few significant t -test ratio
- (iii) high R^2 with high t -test ratio
- (iv) None of the above
- (e) The most common specification error that can be encountered in empirical investigation by a researcher is
- (i) omission of relevant variables
- (ii) inclusion of irrelevant variables
- (iii) adoption of wrong functional form
- (iv) All of the above

(4)

2. Answer the following questions in brief :

3×4=12

(a) What do you mean by a linear regression model?

(b) What causes multicollinearity?

(c) Write in brief about autoregressive and lag model.

(d) What is the difference between OLS and GLS estimators? Which one is better?

3. (a) What is the difference between simple linear regression and classical linear regression? Mentioning the assumptions of a general linear model, obtain an estimate of $\hat{\beta}$ of the vector of unknown coefficient β in matrix form.

Also find the mean of $\hat{\beta}$.

3+3+3=9

(5)

Or

(b) For general linear model

$$Y_{(n \times 1)} = X_{n \times (k+1)} \beta_{(k+1)} + \varepsilon_{(n \times 1)}$$

with usual assumptions, develop the test of significance for individual regression coefficient. Also obtain 100(1- α)% confidence interval for β_i .

9

4. (a) Define specification error. In case of the following model

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

where X_{2i} is omitted mistakenly from the above model. Find the specification bias.

8

Or

(b) Explain an example of simultaneous equation model using economic variable in structural form.

8

(6)

5. (a) Describe the Aitken's estimator. Find its mean and variance. Show that it has least variance in the class of all unbiased linear estimators. $2+3+3=8$

Or

- (b) What is meant by autocorrelation? What are the consequences of the presence of autocorrelation? Describe any one method of detecting autocorrelation. $2+3+3=8$

6. Discuss the following in brief (any two) : $4 \times 2 = 8$

- (a) Consequences of multicollinearity
(b) Consequences of heteroscedasticity
(c) The Gauss-Markov theorem

7. Discuss the reduced form of a simultaneous equations model with the help of Keynesian model of income determination :

$$C_t = \beta_0 + \beta_1 y_t + U_t; 0 < \beta_1 < 1$$
$$Y_t = C_t + I_t$$

5

(Continued)

(7)

(Old Course)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

1. Choose the correct answer from the following $1 \times 5 = 5$

- (a) BLUE is
(i) Best Linear Unbiased Estimator
(ii) Best Linear Unconditional Estimator
(iii) Basic Linear Unconditional Estimator
(iv) None of the above
- (b) In general linear model, $E(UU') =$
(i) $\sigma_u^2 I$
(ii) σ_u^2
(iii) I
(iv) None of the above

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(Turn Over)

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(c) Multicollinearity is used to denote

(i) the presence of linear relationship among explanatory variables

(ii) the presence of non-linear relationship among explanatory variables

(iii) the presence of linear relationship among dependent variables

(iv) the presence of linear relationship among endogenous variables

(d) Multicollinearity can be detected if the regression function has

(i) high R^2 but few significant t -test ratio

(ii) low R^2 but few significant t -test ratio

(iii) high R^2 with high t -test ratio

(iv) None of the above

(e) The most common specification error that can be encountered in empirical investigation by a researcher is

(i) omission of relevant variables

(ii) inclusion of irrelevant variables

(iii) adoption of wrong functional form

(iv) All of the above

2. Answer the following questions in brief :

3×4=12

(a) What do you mean by a linear regression model?

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3+3+3=9

(10)

Or

- (b) For general linear model

$$Y_{(n \times 1)} = X_{n \times (k+1)} \beta_{(k+1)} + \varepsilon_{(n \times 1)}$$

with usual assumptions, develop the test of significance for individual regression coefficient. Also obtain $100(1-\alpha)\%$ confidence interval for β_i .

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Or

- (b) Explain an example of simultaneous equation model using economic variable in structural form.

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2+3+3=8

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(Continued)

(11)

Or

- (b) What is meant by autocorrelation? What are the consequences of the presence of autocorrelation? Describe any one method of detecting autocorrelation.

2+3+3=8

6. Discuss the following in brief (any two) : $4 \times 2 = 8$

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(b) Consequences of heteroscedasticity
(c) The Gauss-Markov theorem

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(CBCS) 3 (H) (N/O)