

This question paper contains 7 printed pages]

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S. No. of Question Paper : 1168

Unique Paper Code : 237603

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Name of the Paper : Econometrics

Name of the Course : B.Sc. (H) Statistics

Semester : VI

Duration : 3 Hours

Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt six questions,

selecting two from each Section.

Section A

1. (a) In the model

$$Y = \alpha + X\beta + u$$

for a given X, obtain a 95% confidence interval for the conditional mean of Y and a prediction interval for an individual y value. Explain the difference between the two. Why is the individual prediction interval wider? Why are these intervals narrowest when X is near its mean?

P.T.O.

(iii) Multicollinearity does not destroy the property of minimum variance.

(iv) Assumption of 'no collinearity' means that the correlation between the regressors and the regressand is zero. 8½,4

5. Explain the concept of autocorrelation and discuss its consequences on the least squares estimation of a general linear model. Suggest a test to encounter this problem. 12½

6. (a) Discuss the Durbin's two stage procedure for estimating the model

$$Y_t = \alpha + \beta X_t + u_t$$

where  $u_t$  follows a first order autoregressive scheme.

(b) Choose the appropriate option :

(1) When supply of a commodity, for example, agricultural goods, reacts to price with a lag of one time period due to gestation period in

production, such a phenomenon is referred to as :

(i) Lag phenomenon

(ii) Cobweb phenomenon

(iii) Inertia

(iv) Business cycle

(2) Using the OLS technique in the presence of autocorrelation will lead to :

(i) t-test and F-test being inaccurate

(ii) Overestimated  $R^2$

(iii) Accurate t-test but inaccurate F- and  $\chi^2$  tests

(iv) Biased estimates

10½,2

### Section C

7. What do you mean by heteroscedasticity ? Describe any two tests for detection of heteroscedasticity, clearly stating their limitations. 12½

P.T.O.

8. Suppose that simple exponential smoothing is being used to forecast the constant process 12½

$$\hat{X}_t = b + \varepsilon_t$$

where

$$V(X_t) = V(\varepsilon_t) = \sigma_\varepsilon^2$$

- (i) Obtain an expression for  $V(S_T)$
- (ii) If  $\sigma_e^2$  is variance of the forecast error, show that :

$$\sigma_e^2 = \frac{2}{2 - \alpha} \sigma_\varepsilon^2$$

9. (a) Define the Aitkin's estimators and obtain an expression for the same. Obtain its mean and variance.
- (b) Choose the appropriate option :
- (i) Estimating the linear regression model in the presence of heteroscedasticity using this method leads to Best Linear Unbiased estimators :
- (i) Ordinary least squares
- (ii) Generalised least squares
- (iii) Maximum likelihood
- (iv) Two-stage regression estimation

- (2) Reordering the observations with respect to the explanatory variable is the first step in conducting the following heteroscedasticity test :
- (i) Goldfeld-Quandt test
- (ii) Spearman's rank correlation test
- (iii) Glejser test
- (iv) Graphical inspection of residuals. 10½, 2