2018

STATISTICS

(Major)

Paper : 5.3

(Applied Statistics–I)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Answer the following questions as directed : 1×7=7

(a) Give the full form of BLUE.

(b) In usual notation, r^2 means _____.

(Fill in the blank)

(c) A 95% confidence interval for the parameter β in the linear model $Y = \alpha + \beta X + U$ can be used to test the null hypothesis $H_0 : \beta = 0$.

(State True or False)

(d) Define purchasing power of money in terms of the cost of living index number.

(c) Let d_1 and d_2 represent the demand of a commodity for two strata of a population. If η_1 and η_2 be the elasticities of demand with respect to national income for the two strata, show that the corresponding elasticity η for the two strata combined would be given by

$$\eta = \frac{\eta_1 d_1 + \eta_2 d_2}{d_1 + d_2}$$

(d) Interpret all the assumptions made on the disturbance term in the linear model

$$Y_i = \alpha + \beta X_i + U_i \ (i = 1, 2, \ldots\ldots, n)$$

Which assumptions are in relation to non-autocorrelation and homo-scedasticity?

(e) Discuss different steps for constructing wholesale price index numbers.

4. State and prove Gauss-Markov theorem. 10

Or

Explain how you would construct 95% confidence intervals for the three unknown parameters α, β and σ_u^2 in the simple linear model. Mention utility of confidence interval in testing of hypothesis. 3+3+3+1=10

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(e) Pareto's curve fits much better for _____ income group.

(Fill in the blank)

(f) Define equilibrium price of a product.

(g) Is there any difference between trend and secular trend?

2. Answer the following questions : 2×4=8

(a) What is ideal about Fisher's index number?

(b) Write two limitations of curves of concentration.

(c) What do you mean by a stationary time series?

(d) Write the assumptions in the linear model $Y = \alpha + \beta X + U$.

3. Answer any *three* of the following questions : 5×3=15

(a) While measuring trend by the method of curve fitting using least square method, what are various types of curves that may be used to describe the given data? Give mathematical expression for the curves with names.

(b) Discuss various forms of Engel's curve that are usually employed for fitting family budget data.

5. Discuss different methods of measuring seasonal variations in a time series. Also write relative merits and demerits of each method. 10

Or

State Pareto's law of income distribution and explain the significance of its parameters. What are the limitations of the law? 10

6. Answer either *(a)* or *(b)* :

(a) *(i)* Prove that Fisher's index number lies between Laspeyres' and Paasche's index numbers. 3

(ii) Describe different tests for index numbers. 4

(iii) Show that Fisher's index number satisfies some important tests. 3

(b) Write short notes on any *two* of the following : 5×2=10

(i) Multicollinearity

(ii) Heteroscedasticity

(iii) Measurement of cyclical fluctuations

(iv) Elasticities of various forms of Engel's curve

(v) Errors in index numbers

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