2016

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) Periodic changes in a time series related to business activities are called _____.

(Fill in the blank)

(b) Fisher's ideal formula for index numbers does not satisfy

(i) time reversal test

(ii) circular test

(iii) factor reversal test

(iv) None of the above

(Choose the correct option)

(c) State Engel's law.

(d) It has been found empirically that the Pareto curve fits much better for _____ income groups.

(Fill in the blank)

(e) In the regression equation $Y = \alpha + \beta X$, β is called

(i) slope of X

(ii) intercept of X

(iii) intensity of X

(iv) coefficient of X

(Choose the correct option)

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

(g) The general decline in the sales of cotton clothes is attached to which component of the time series?

(i) Secular trend

(ii) Seasonal variation

(iii) Cyclical variation

(iv) All of the above

(Choose the correct option)

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

(a) What is the rational behind the concept of index numbers?

(b) State one merit and one demerit of the link relative method.

(c) Explain the concept of multicollinearity.

(d) What do you mean by curves of concentration?

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

(a) Write an explanatory note on the oscillatory component of a time series with suitable examples. 5

(b) Define econometrics. Discuss the linear models used in econometrics. 2+3=5

(c) What is family budget enquiry? Discuss the construction of cost of living index number by family budget enquiry. 2+3=5

(d) Obtain the Lorenz coefficient of concentration for the Pareto income distribution. 5

(e) Explain demand and supply curves. The demand and supply curves of a commodity are given by $D = 250 - 3p^2$ and $S = p^2 + 2p^4$ respectively, p being the price. Find the equilibrium price and the quantity of commodity exchanged. 2+3=5

4. Answer *either (a) or (b)* : 10

(a) (i) Discuss about the choice of weights and different formulae derived therein for the construction of index numbers. 6

(ii) Define cost of living index number. Mention four of its uses. 4

(b) (i) What is factor reversal test? Show that Fisher's index number satisfies this test. Again, if Laspeyre's price index is equal to Paasche's price index, then prove that both of these index numbers satisfy the time reversal test. 1+3+3=7

(ii) Write short note on (any *one*) : 3

(1) The index of agricultural production

(2) The scope of econometrics

(*Continued*)

5. Answer *either (a) or (b) or (c)* : 10

(a) Explain the concept of elasticity of demand. What is its significance? If the demand function is $Q = 25 - 4P + P^2$, where Q is the quantity demanded and P is the price, what is the elasticity of demand when price is ₹ 8? Explain how the price elasticity of demand is obtained form time series data. 3+3+4=10

(b) Mention the assumptions and discuss the effects of violation of the assumptions in an econometric model of the form

$$Y_t = \beta_0 + \beta_1 X_t + u_t$$

Also find the least squares estimate of β_0. 7+3=10

(c) *(i)* State Pareto's law of income distribution and explain the significance of its parameters. Mention one limitation of the law. 2+3+1=6

(ii) Write a note on Gini's coefficient. 4

6. Answer *either (a) or (b)* : 10

(a) *(i)* Discuss the merits and drawbacks of trend fitting by the principle of least squares. 4

(ii) What is secular trend? Discuss the method of moving averages used for determining trend in a time series. 1+5=6

(b) (i) Explain the Ratio to Trend method of measurement of seasonal variation. 4

(ii) Write short notes on (any *two*) : 3×2=6

(1) Correlogram
(2) Periodogram
(3) Autoregressive series
(4) Test for linearity of regression

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