2 0 1 9

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) Purpose of measuring trend is to have the knowledge of past behaviour of the factor which is responsible for persistent growth or decline.

   (State True or False)

   (b) Define random fluctuations in a time series.

   (c) What do you mean by demand for a commodity?

(2)

(d) Suppose the price of wheat in India in 1970 was ₹ 95 per quintal and in 1969 it was ₹ 80 per quintal. What is the price relative of wheat for 1970?

(e) Cost of living index number is based on wholesale prices.

(State True or False)

(f) Which is a random variable in the simple linear model $Y = \alpha + \beta X + U$ and by what name it is known?

(g) When are two variables called homoscedastic?

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

(a) Mention the main steps in the construction of wholesale index numbers.

(b) Write the null and alternative hypothesis for testing the significance of the regression coefficient of the explanatory variable in the model $Y = \alpha + \beta X + U$.

(c) The demand and supply function of a commodity are given by

$$D = 14 + 5p - p^2 \text{ and } S = 3p - 1$$

Find the equilibrium price and the quantity exchanged.

(3)

(d) Which component of the time series is mainly applicable in the following cases?

(i) A strike in steel industry

(ii) Sales of new year greeting cards

(iii) Price of gold over last 50 years

(iv) The expenditure of political parties in days of election

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

(a) What are moving averages? Discuss how they are useful in the analysis of economic time series.

(b) From the fixed base index numbers given below, prepare chain base index numbers :

Year	:	1969	1970	1971	1972	1973	1974
Index Nos.	:	200	220	240	250	280	300

(c) The demand function of a commodity is given by

$$D = \sqrt{\left(\frac{4 - p}{5} \right)}$$

For what value of D, the elasticity of demand η_p will be 1?

(d) Set out the test for the significance of X in the simple linear model $Y = \alpha + \beta X + U$ in analysis of variance framework.

(e) What do you understand by econometrics? Write a note on scope and limitations of econometrics.

4. *(a)* *(i)* Describe the errors involved in the measurement of price and quantity index numbers. Explain how you will control them.

(ii) Write a note on index number of industrial production. 6+4=10

Or

(b) Explain Engel's law and different forms of Engel's curve. Also find demand elasticity of these forms with respect to income. 4+6=10

5. *(a)* *(i)* What do you mean by Lorenz curve and concentration ratio? Explain.

(ii) Describe various tests involved in index numbers. 6+4=10

Or

(b) Discuss various methods of determination of trend in a time series with merits and demerits. 10

6. *(a)* Write notes on the following (any *two*) : 5×2=10

(i) Autocorrelation

(ii) Pareto's law of income distribution

(iii) Coefficient of determination

Or

(b) Estimate the parameters of the linear model $Y = \alpha + \beta X + U$. Show that $E(\hat{\alpha}) = \alpha$, $E(\hat{\beta}) = \beta$, where $\hat{\alpha}$ and $\hat{\beta}$ are least square estimators for α and β. Also find standard errors of $\hat{\alpha}$ and $\hat{\beta}$. 3+3+4=10

★ ★ ★