

[This question paper contains 3 printed pages.]

4707

Your Roll No.

B.Sc. (G)/II

AS

MATHEMATICAL SCIENCES (STATISTICS)

Paper IV – Applied Statistics

Time : 3 Hours

Maximum Marks : 38

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

Attempt any six questions.

All questions carry equal marks.

1. (a) What is meant by a time series? Indicate its importance in business and economics.
(b) What do you mean by seasonal variation, in a time series? Explain the link relative method of measuring seasonal indices.
2. (a) Prove that Marshall-Edgeworth index number lies between Laspeyre's and Paasche's index numbers.
(b) What are the uses and limitations of a cost of living index number? Explain, how it is constructed.
3. (a) Explain the basic principles underlying the control charts and discuss their role in a manufacturing process.

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- (b) Derive the control limits of a p-chart when all samples are of same size. How are these limits modified for variable sample size ?
4. (a) Describe the single sampling plan in quality control. Obtain the OC and AOQ functions for this plan.
- (b) Distinguish between (i) producer's risk and consumer's risk and (ii) AQL and LTPD.
5. (a) Explain crude and standardised death rates. In what way is standardised death rate superior to crude death rate ?

(b) In usual notations, prove that

$$(i) m_x = \frac{2q_x}{2 - q_x},$$

$$(ii) e_x^0 = \frac{\Gamma_x}{l_x},$$

$$(iii) L_x = l_{x+1/2}.$$

6. (a) Assuming that the force of mortality increases in a geometric progression throughout life, derive an expression for l_x .
- (b) Interpret the parameters of a logistic curve for measuring the growth of a population. Is this curve suitable for representing the growth of Indian population ?

7. (a) Examine the nature, scope and limitations of the Price statistics in India.
- (b) What was the objective in establishing the CSO ? What functions does it perform today ? List some of its important publications.
8. Write short notes on any **three** of the following :
- (i) Components of a time series
 - (ii) \bar{X} -and R-charts
 - (iii) Fisher 'ideal' index number
 - (iv) Trade statistics in India
 - (v) Reproduction rates