

FIRST YEAR B.Sc. DEGREE EXAMINATION, MARCH/APRIL 2005

Part III—Group (vii)—Statistics (Main)

Paper I—DESCRIPTIVE STATISTICS AND NUMERICAL METHODS

Time : Three Hours

Maximum : 65 Marks

Not more than 13 marks will be awarded from each unit.

Unit I

- 1. Distinguish between Arithmetic mean and Geometric mean. Specify the fields in which Geometric mean can be more appropriately used. (5 marks)
- 2. Obtain the standard deviation of the first 'n' natural numbers. (5 marks)
- 3. Show that the root mean square deviation is least when it is measured from the mean. (5 marks)
- 4. Define skewness and kurtosis of a distribution. Give any one measure of skewness and kurtosis. (5 marks)
- 5. Define the following :—
 - (a) Sheppard's Correction.
 - (b) Principle of least squares.
 - (c) Lorenz Curve.
 (6 marks)

Unit II

- 6. Distinguish between correlation and regression. (5 marks)
- 7. Prove that correlation coefficient is the geometric mean between the regression coefficients. (5 marks)
- 8. In a trivariate distribution $\sigma_1 = 2, \sigma_2 = \sigma_3 = 3, r_{12} = 0.7, r_{23} = r_{31} = 0.5$. Find :
 - (1) $r_{23.1}$
 - (2) $R_{1.23}$
 - (3) $b_{12.3}$
- 9. Show that $1 - R_{1.23}^2 = (1 - r_{12}^2)(1 - r_{13.2}^2)$. (6 marks)
- 10. Explain the following :
 - (a) Correlation ratio.
 - (b) Intra class correlation.
 (5 marks)

Unit III

- 11. Define index number and point out the limitations. (5 marks)
- 12. What is meant by weighting in index numbers ? What are the various ways of assigning weights in the construction of index numbers ? (5 marks)

- 13. Explain Time Reversal Test and Factor Reversal Test. (5 marks)
- 14. What are the steps involved in the construction of consumer price index numbers ? (5 marks)
- 15. Explain the terms Deflating, splicing and base shifting. (6 marks)

Unit IV

- 16. Define : (6 marks)
 - (a) Time Series.
 - (b) Secular Trend.
 - (c) Irregular variations.
- 17. What do you mean by multiplicative and additive models of the composition of components of times series ? (5 marks)
- 18. Explain the meaning and use of 'Moving averages'. (5 marks)
- 19. Explain the method of fitting : (5 marks)
 - (1) Straight line trend.
 - (2) Quadratic trend to a time series.
- 20. What are the advantages and disadvantages of the method of least squares ? (5 marks)

Unit V

- 21. Prove that : (5 marks)
 - (a) $\Delta(U_k V_k) = U_k \Delta V_k + V_{k+1} \Delta U_k$.
 - (b) $\Delta \left(\frac{U_k}{V_k} \right) = \frac{V_k \Delta U_k - U_k \Delta V_k}{V_{k+1} V_k}$.
- 22. Show that the n^{th} difference of a polynomial of n^{th} degree are constant, when the values of the independent variable are taken in arithmetic progression. (6 marks)
- 23. Establish Lagrange's formula for interpolation. (5 marks)
- 24. Obtain Everette's Formula for numerical interpolation. (5 marks)
- 25. Derive Weddle's rule of numerical integration. (5 marks)