

[This question paper contains 4 printed pages.]

1424

Your Roll No. ....

**B.Sc. (Hons.) / II**

**A**

**STATISTICS – Paper XIV**

**(Applied Statistics – II)**

**(Admissions of 1999 and onwards)**

*Time : 2 Hours*

*Maximum Marks : 38*

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

*Attempt Five questions in all, including  
Question No. 1 which is compulsory.  
Select any two from each Section.*

1. Distinguish between

- (i) Z-scores and Normalized scores
- (ii) Consumer's risk and Producer's risk in the context of statistical quality control
- (iii) Additive and multiplicative models of a time series (2,2,2)

**SECTION – I**

2. (a) With which component of a time series do you mainly associate each of the following :

P.T.O.

- (i) An area of prosperity
- (ii) Decrease in employment in a sugar factory during the off season ?

Describe Ratio-to-moving average method for determining seasonal fluctuations of a time series.

- (b) Name different components of a time series. Obtain a suitable weighted moving average formula for measuring trend covering consecutive sets of seven points which would accurately represent the series if it consists of a quadratic polynomial in a time variable. (4,4)

3. (a) Describe the different growth curves ? Why is the method of least squares not used to fit a logistic curve ? Describe the method of three selected points to fit this curve.

- (b) Show that  $p_n$ , the probability of the mean of a random sample of size  $n$  exceeding  $UCL = \mu' + \frac{3\sigma'}{\sqrt{n}}$ , when the population mean has shifted to  $\mu' + K\sigma'$  is  $G(3 - K\sqrt{n})$  where

$$G(x) = \frac{1}{\sqrt{2\pi}} \int_x^{\infty} e^{-\frac{1}{2}u^2} du \quad (4,4)$$

4. (a) Distinguish between control charts for variables and control charts for attributes. Describe the construction of control chart for number of defects per unit with some examples.
- (b) Define Reliability. What are different methods of estimating the reliability of tests? Describe Rulon method of estimating reliability. (4,4)

### SECTION - II

5. (a) Compare Natural tolerance limits and specification limits. Does a process in control ensure that all the product will be within specification limits? What do you mean by modified limits?
- (b) Describe a method for estimation of the variance of the random component of a time series, stating assumptions under which it is applicable. Also test the significance of two successive estimates of the variance of the random component. (4,4)
6. (a) Define Lot tolerance percent defective and Average Outgoing Quality in sampling inspection plans. Obtain OC function for the single sampling plan.
- (b) Define validity of a test. Discuss the effect of lengthening of a test on its validity. (4,4)

7. Write notes on the following :

- (i) Percentile scores
- (ii) Cyclical movement
- (iii) Control chart for number of defectives
- (iv) Double Sampling Plan (2,2,2,2)