

# RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

SECOND YEAR

B.A./B.SC. THIRD SEMESTER (July – December) 2014

Mid-Semester Examination, September 2014

Date : 18/09/2014

STATISTICS (General)

Time : 12 noon – 1 pm

Paper : III

Full Marks : 25

**[Use a separate answer book for each group]**

## Group – A

1. Discuss the problem of selection of Base year in the construction of an Index Number.  
Also state the uses of consumer's Price Index Number. [5]

**Or,**

State and explain the two common tests of a Satisfactory Index Number and show that Fisher's Ideal Index Number satisfies both the tests.

2. Discuss the various components of a time series. [5]

**Or,**

State the Least Square Method of determination of a linear trend equation and discuss the advantages of the method.

## Group – B

(Answer **any three** questions)

3. If  $x_1, x_2, \dots, x_n$  are the outcomes of  $n$  independent bernoullian trials with constant probability  $p$  of success in each trial and if
- $$\left. \begin{array}{l} x_i = 1 \text{ with probability } p, i = 1, 2, \dots, n \\ = 0 \text{ otherwise} \end{array} \right\}$$

and we define  $S = x_1 + x_2 + \dots + x_n$ , show that  $\frac{S(S-1)}{n(n-1)}$  will be an unbiased estimator of  $p^2$ . [5]

4. Suppose that the time taken by a certain particle to move from one point to another fixel point is distributed as Normal  $(\mu, \sigma^2 = 9)$ . A random sample of 16 readings has mean 52. Test the hypothesis that  $H_0: \mu = 53$  against  $H_1: \mu \neq 53$  at 0.05% level of significance. [Given  $\Phi(1.96) = 0.975$ ] [5]

5. For the exponential distribution  $f(x, \theta) = \frac{1}{\theta} e^{-\frac{x}{\theta}}$ ;  $0 \leq x < \infty$ ,  $\theta > 0$ , we test the null hypothesis  $H_0: \theta = 2$  against the one-sided alternative  $H_1: \theta > 2$  on the basis of the following test procedure : Reject  $H_0$ , if an observation from the population ( $x$ ) is greater than 6. Find the type-I error & power function. [5]

6. A random sample of size 4 is drawn from the population with p.d.f.

$$f(x) = \frac{x}{2}; \quad 0 \leq x \leq 2$$

Find the chance that exactly 2 out of 4 sample values will exceed 1. [5]