

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. THIRD SEMESTER EXAMINATION, DECEMBER 2017

SECOND YEAR [BATCH 2016-19]

STATISTICS [General]

Date : 19/12/2017

Time : 11 am – 1 pm

Paper : III

Full Marks : 50

[Use a separate Answer Book for each Group]

Group – A

Answer any two questions from Question Nos. 1 to 4 :

[2×5]

1. Suppose we draw two observations X_1 and X_2 at random from $N(\mu, \sigma^2)$ and wish to estimate μ . We define an estimator of μ as $T = aX_1 + bX_2$. What are the values of a & b for which T is MVUE.
2. Suppose a_n is the number of successes in n bernoullian trials with p as the unknown probability of success in a trial. Show that $\frac{a_n}{n}$ is a consistent estimator of p .
3. A sample of size n is drawn from the uniform population defined as follows : $f(x, \theta) = \frac{1}{\theta}$; $0 < x \leq \theta$. Find the MLE of θ .
4. A random sample is drawn from a normal population. The data give sample size & sample variance only. Give reasons as to what statistic would you use to test the hypothesis that the population variance has a particular value. [Assume population mean is unknown]

Answer any two questions from Question Nos. 5 to 8 :

[2×10]

5. Show, in case of both SRSWR & SRSWOR, that sample mean is the unbiased estimator of population mean. Also, derive the expression for the S.E of the sample mean in both the situations. [3+7]
6. In the context of testing for the equality of two means, bring out the difference between Fisher's t-test & Paired-t test, clearly specifying the underlying assumptions & coming up with the respective test statistics. [10]
7. In statistical Inference, explain the application of Pearsonian statistics for testing :
 - ◆ homogeneity of similarly classified populations
 - ◆ Independence of two attributes : [10]
8. Using a random sample of size n from a normal population $N(\mu, \sigma^2)$, you want to test the following $H_0 : \mu = \mu_0$ vs. $H_1 : \mu \neq \mu_0$. Assume σ^2 is not known. How would you carry out the test if F-table alone is available to you. [10]

Group – B

Answer any two questions from Question Nos. 9 to 12 :

[2×5]

9. Define a time series with an example. What do you mean by secular trend in the analysis of time series data. State two methods to obtain trend values. [2+2+1]
10. Discuss residual method for measuring cyclical variations in time series analysis. [5]
11. What do you mean by COLIN? Explain how will you calculate COLIN. [2+3]
12. What is an index number? What are the uses of index number? [2+3]

Answer any one question from Question Nos. 13 & 14 :

[1×10]

13. Briefly explain the following concepts.

- a) Chain index number.
- b) Test of index number.
- c) Wholesale price index number.
- d) Marshall-Edgeworth price index number.
- e) Real Wage.

[2×5]

14. Describe how you would fit—

- a) linear trend
- b) exponential trend to time series data using method of least square.

[5+5]

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