

Reg No:

Date :



ST JOSEPH'S UNIVERSITY, BENGALURU -27

B.Sc. Statistics – 4th SEMESTER

SEMESTER EXAMINATION: APRIL 2024

(Examination conducted in May / June 2024)

ST422: Statistical Inference - I

(For current batch students only)

Time: 2 Hours

Max Marks: 60

This paper contains TWO printed pages and THREE parts

PART-A

I. Answer any FIVE of the following

3 X 5 = 15

1. State Neyman-Factorization Theorem.
2. Define consistent estimator and prove that sample mean is a consistent estimator of the parameter p in case of geometric distribution.
3. Explain Maximum Likelihood estimator (MLE). State any two properties of MLE.
4. Derive the method of moments for parameter ' p ' which follows Binomial distribution.
5. What is margin of error? Explain the concept of confidence interval using statistical definition.
6. Explain the pivot method for construction of confidence interval.
7. Find the interval estimation of population mean at 95% confidence interval, given the sample mean of boiling point of certain liquid is 101.82 degree with a SD 1.2 degree. ($Z=1.96$)

II. Answer any FIVE of the following

5 X 5 = 25

8. Discuss why MLE cannot be a suitable procedure for estimating $U(a, b)$. Also obtain its estimate using Method of moments.
9. Construct $100(1-\alpha)\%$ confidence interval for population mean when variance is unknown.
10. Explain the types of testing in hypothesis tests with the help of graphs.
11. What is Type-I error and Type-II error? Derive the relation between Type-II error and power of the test.
12. What is a Test function? Explain Randomized and Non-Randomized tests.
13. Define Efficiency. Prove that sample mean is more efficient than sample median when the sample is drawn from normal distribution.
14. Verify whether sample mean is Minimum Variance Unbiased Estimator (MVUE) for the parameter of exponential distribution.

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III. Answer any TWO of the following

10X 2 = 20

15. A. Derive the Maximum likelihood Estimator for $N(\mu, \sigma^2)$.
B. What is a Pivot quantity? Explain. (7+3)
16. A. Derive 100(1- α)% Confidence interval for population correlation coefficient.
B. Derive the Method of Moments for parameter 'p' which follows Negative-Binomial distribution. (7+3)
17. A. Show that $\frac{\sum_{i=1}^n x_i + 1}{n+2}$ is consistent estimator of p in Bernoulli distribution.
B. Describe k-parameter exponential family with an example. (5+5)
