B.Sc. (Honours) Examination, 2019
Semester-IV
Statistics (Allied)
Course : BSA-41 (Old)

Time : 3 Hours **Full Marks : 40**

Questions are of value as indicated in the margin

Answer **any four** questions from the following

1. Let $X_1, X_2, \cdots, X_n$ be a random sample from a Normal distribution with mean μ and variance σ^2.

   (a) Find the maximum likelihood estimator of μ. 4

   (b) Find the maximum likelihood estimator of σ^2 when μ is unknown. 6

2. (a) What is method of moment estimator? Give an example where more than one method of moment estimator exists. 5

   (b) Let $X_1, X_2, \cdots, X_n$ be a random sample from a Binomial distribution with parameter n and p. Find the method of moment estimator of p. 5

3. (a) Define minimum variance unbiased estimator. 1

   (b) If $X \sim \text{Binomial}(n, p)$, then prove that $T = \frac{X(X-1)}{n(n-1)}$ is an unbiased estimator of p^2. 4

   (c) Let X_1, X_2, X_3 be a random sample from a Poisson distribution with parameter λ. If

   $$T_1 = \frac{X_1 + 2X_2 + 3X_3}{6}, \; T_2 = \frac{X_1 + X_2 + X_3}{3}$$

   then show that T_1 and T_2 are unbiased estimator of λ. Find the variance of T_1 and T_2 and state which one is better. 5

4. Define the following terms $(5 \times 2 = 10)$

   (a) Simple and composite hypothesis

   (b) Null and alternative hypothesis

   (c) Critical region

   (d) Power of the test

   (e) Level of significance

P.T.O.

5. What is analysis of variance? State the assumptions made in analysis of variance. Describe the technique of analysis of variance in one way classified data. 10

6. What is interval estimation and what is point estimation? Let $X_1, X_2, \cdots, X_n$ be a random sample of size n from $N(\mu, \sigma^2)$. Discuss the testing procedure of $\mu = 0$ against $\mu > 0$. 10