2103E1265   Candidate's Seat No : _____

B.Sc. Semester-5 Examination
CC 301
Statistics

Time : 2-30 Hours]   March-2024   [Max. Marks : 70

1. (i) Discuss about the sampling distribution and standard error.
    (ii) Show that the sample raw moment is an unbiased estimator of the corresponding population raw moment. State the formula for variance of μ'_r and standard error of μ'_r.

OR

(i) Obtain standard error of sample central moment.
(ii) Obtain the expression for standard error of sample mean.

2. (i) Explain the concept of Unbiasedness. For any distribution, show that sample mean is an unbiased estimator of the population mean.
    (ii) Let $X_1, X_2, \cdots, X_n$ be a random sample of size n from $U(\theta, \theta + 1)$ distribution. Show that the sample mean is both unbiased and consistent estimator of $\theta + \frac{1}{2}$.

OR

(i) State and prove Rao-Cramer Inequality for the variance of an unbiased estimator.
(ii) Let $X_1, X_2, \cdots, X_n$ be a random sample from $N(\mu, \sigma^2)$ distribution. Let $s^2 = \frac{1}{n}\sum_{i=1}^{n}(X_i - \overline{X})^2$ be the sample variance. Obtain the efficiency of $\frac{ns^2}{n-1}$.

3. (i) Explain the method of moment for estimation of the unknown parameter.
    (ii) Let $X_1, X_2, \cdots, X_n$ be a random sample of size n from distribution with pdf $f(x) = e^{-(x-\theta)}$, $x > \theta$. Obtain maximum likelihood estimator of the parameter θ.

OR

(i) Explain the method of maximum likelihood for estimation of the unknown parameter.
(ii) Let $X_1, X_2, \cdots, X_n$ be a random sample of size n from $G(\alpha, \beta)$ distribution. Obtain moment estimator of the parameters α and β.

4. (i) Explain the problem of interval estimation in detail.
    (ii) Obtain $100(1-\alpha)\%$ confidence interval for the difference between the means of two normal populations when their variances are equal and unknown.

OR

(i) Obtain $100(1-\alpha)\%$ confidence interval for the variance of normal distribution when its mean is unknown.
(ii) Obtain $100(1-\alpha)\%$ confidence interval for the population proportion in binomial distribution.

B.Sc. Semester V (Statistics STA-301)
Semester Examination

5. Attempt any **Seven**.

   (i) Explain the uses of method of moments.

   (ii) What do you mean by biased estimator?

   (iii) What do you mean by pivotal statistic?

   (iv) State the confidence limits for the mean μ of a normal distribution when variance σ^2 is known.

   (v) State factorization theorem on sufficiency.

   (vi) What is the moment estimator of p for a Poisson distribution $P(\lambda)$?

   (vii) Define Likelihood function.

   (viii) Let $f(x) = e^{-x}, x > 0$. Find the expected value of the length of the interval $(X, 3X)$.

   (ix) State invariance property of MLE.

   (x) State the sufficient condition for consistency.

   (xi) Define confidence coefficient.

   (xii) What do you mean by sufficiency?

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