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GN-235

III Semester B.Sc. Examination, December - 2019

(Fresh+Repeaters) (CBCS 2018-19 and Onwards)

STATISTICS - III

STATISTICAL INFERENCE - I

Time : 3 Hours Max. Marks : 70

Instructions : *(i) Answer **any ten** sub-divisions from section-A and **any five** questions from section-B.*

(ii) Scientific calculator is permitted.

SECTION - A

I. Answer **any ten** sub-divisions from the following : **10x2=20**

1. (a) Define standard error and mention its use.

(b) Explain the following terms w.r.t. statistical inference :

(i) Random Sample (ii) Parameter Space

(c) Given T is an estimator of a parameter θ, then prove that M.S.E $(T) \geq V(T)$.

(d) Define Consistency.

(e) Write an expression for Fisher's Information in terms of expectation.

(f) Define Minimum Variance Unbiased Estimator (MVUE).

(g) Obtain Method of Moment Estimator (MME) of P in Bernoulli B(I, P) distribution.

(h) What is interval estimation ? Explain.

(i) Write $(1-\alpha)100\%$ Confidence Interval (CI) for population mean μ, when sampling is from Normal $N\left(\mu, \sigma_0^2\right)$ distribution.

(j) Write $(1-\alpha)100\%$ C.I. for the difference of two Binomial population proportions $(P_1 - P_2)$

(k) Explain simulation.

(l) Mention the disadvantages of simulation.

SECTION - B

II. Answer **any five** questions from the following : **5x10=50**

2. (a) Obtain sampling distribution of sample mean $\bar{x}$, when the random sample of size 'n' is drawn from normal (μ, σ_0^2) distribution. **4+6**

(b) Derive the moment generating function of Chi-Square distribution and hence establish additive property.

P.T.O.

3. (a) Derive odd ordered central moments of t-distribution with n degree of freedom and hence find its mean. **5+5**

   (b) Obtain mean of F-distribution.

4. (a) If $x_1, x_2, x_3, \ldots\ldots, x_n$ is a random sample of size 'n' from $N(0, \sigma^2)$, then show that $\frac{1}{n}\sum_{i=1}^{n} x_i^2$ is an unbiased estimator for σ^2. **5+5**

   (b) State sufficient condition for consistency and hence obtain consistent estimator of μ in $N(\mu, \sigma^2)$ distribution.

5. (a) For a Cauchy population show that sample median is a consistent estimator. **3+7**

   (b) Let $x_1, x_2, x_3, \ldots\ldots, x_n$ is a random sample of size 'n' from $N(\mu, \sigma^2)$ distribution. Show that sample mean is more efficient than sample median.

6. (a) State Neyman Factorization theorem. Obtain a sufficient statistic for p in Binomial B(n, p) distribution. **5+5**

   (b) Derive the Minimum Variance Bound (MVB) for the estimator in Poisson $P(\lambda)$ distribution and show that sample mean attains it.

7. (a) Write the properties of Maximum Likelihood Estimator (MLE). Obtain the MLE of parameter p of Binomial B(n, p) distribution. **5+5**

   (b) Obtain moment estimator of α and β in uniform (α, β) distribution.

8. (a) Obtain $(1-\alpha)100\%$ C.I. for the population variance σ^2 when the sample is drawn from $N(\mu, \sigma^2)$ distribution (sample size is small). **6+4**

   (b) Obtain $(1-\alpha)100\%$ C.I. for the population correlation coefficient.

9. (a) Explain the method of generating a random sample from exponential distribution. **5+5**

   (b) Explain the method of generating random samples from $N(\mu, \sigma^2)$ distribution.

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