Seat No. : _____

NB-113

November-2021

B.Sc., Sem.-V

CC-301 : Statistics
(Statistical Inference – 1)

Time : 2 Hours] **[Max. Marks : 50**

Instructions : (1) **All** questions in **Section – I** carry equal marks.

(2) Attempt any **3** questions in **Section – I**.

(3) Question-**9** in Section – II is **compulsory**.

SECTION – I

Attempt any **three** questions out of **eight** questions.

1. (A) Find out standard error of sample raw moment. **7**

   (B) What is probable error ? Discuss in detail. **7**

2. (A) Explain standard error of the mean. **7**

   (B) Explain standard error of sampling correlation co-efficient. **7**

3. (A) Explain unbiasedness, efficiency and sufficiency of an estimator. **7**

   (B) State and prove Fisher Neyman theorem on sufficiency. **7**

4. (A) X_1, X_2 and X_3 is a μ. Sample of size 3 from a population with mean μ and variance σ^2 is taken. T_1, T_2, T_3 are the estimators used to estimate mean value μ, where **7**

   $T_1 = X_1 + X_2 - X_3$

   $T_2 = 2X_1 + 3X_3 - 4X_2$

   (1) Are T_1 and T_2 unbiased estimators ?

   (2) Which is the best estimator among T_1, T_2 ?

(B) If T_1 and T_2 are two unbiased estimators of $\gamma(\theta)$, having the same variance and ρ is the correlation between them, then show that $\rho \geq 2e - 1$, where e is the efficiency of each estimator. **7**

5. (A) Write properties of maximum likelihood estimator. **7**

(B) Write a short note on methods of moments. **7**

6. (A) Let $X_1, X_2, ..., X_n$ be a random sample from normal population with parameter μ and σ^2. Obtain MLE of μ when σ^2 is known. **7**

(B) Estimate the parameter θ by method of moments from the following pdf : **7**

$$f(x, \theta) = (\theta + 1). x^{\theta}; 0 < x < 1$$

7. (A) Define parameter and statistic. State the general problem of parameter estimation. **7**

(B) Obtain 95% confidence limits for population mean. **7**

8. (A) What is interval estimation ? Give its importance. **7**

(B) Derive 99% confidence interval for population variance. **7**

SECTION – II

9. Attempt any **eight** : **8**

(1) Under most general conditions MLE's are _____.

(a) Sufficient (b) Inconsistent

(c) Efficient (d) Consistent

(2) Full form of MLE

(a) Maximum Livelihood Estimator

(b) Minimum Likelihood Estimator

(c) Monetary Likelihood Estimator

(d) Maximum Likelihood Estimator

(3) Full form of MOM

(a) Method Of Moments (b) Moments Of Method

(c) Method Of Motion (d) Method Of Mathematics

(4) Full form of BLUE

(a) Buyers Linear Unbiased Estimator

(b) Best Linear Unbiased Estimator

(c) Black Linear Unbiased Estimator

(d) Best Logarithmic Unbiased Estimator

(5) Full form of MUE

(a) Mean Unbiased Estimator (b) Maximum Unbiased Estimator

(c) Minimum Unbiased Estimator (d) Median Unbiased Estimator

(6) Full form of MUVE

(a) Minimum Variance Unbiased Estimator

(b) Maximum Variance Unbiased Estimator

(c) Minimum Value Unbiased Estimator

(d) Maximum Valued Unbiased Estimator

(7) If r <PE(r) then correlation is

(a) Significant (b) Insignificant

(c) Inconsistent (d) None of the above

(8) By the method of moments one can estimate :

(a) All Constants of a Population

(b) Only Mean and Variance of a Distribution

(c) All Moments of a Population Distribution

(d) All of the Above

(9) Cramer Rao inequality is valid in case of

(a) Upper bound on the variance

(b) Lower bound on the variance

(c) The asymptotic variance of an estimator

(d) None of the above

(10) How many criteria should be satisfied by a good estimator ?

(a) 1 (b) 2

(c) 3 (d) 4