ST - 431

Total No. of Pages :3

Seat No.	

B.Sc. (Part -III) (Semester - V) Examination, December - 2016

STATISTICS

Statistical Inference - I (Paper - X)

Sub. Code: 65859

Day and Date : Thursday, 08 - 12 - 2016 **Total Marks : 40**

Time : 12.00 noon to 2.00 p.m.

Instructions : **1) All questions are compulsory.**

2) Figures to the right indicate full marks.

Q1) Choose the correct alternative from each of the following: **[8]**

a) The standard error of the estimator of parameter μ of $N(\mu, 100)$ population based on a sample of size 25 is

i) 5 ii) 4

iii) 2 iv) 10

b) If a statistic T is unbiased estimator of parameter θ then unbiased estimator of $4\theta + 7$ is

i) 4T ii) 4T+7

iii) 4T–7 iv) T + 7

c) Let $T(X_1, X_2, \ldots X_n)$ be an unbiased estimator of parameter θ. Then

i) MSE (T) = V(T)

ii) $MSE(T) = V(T) + [Bias (T)]^2$

iii) Bias(T) = 0

iv) Both (i) and (iii)

P.T.O.

d) Let $X_1, X_2, \ldots X_n$ be a random sample of sizen n taken from a population with mean μ and variance σ^2. Then the sample mean is ________ estimator if μ.

i) Consistent

ii) Unbiased

iii) Biased

iv) Both (i) and (ii)

e) Suppose 30.4, 7.8, 1.4, 13.1, 67.3 are independent times (in hrs) to failure for a piece of equipment assumed to have an exponential distribution with parameter λ. Then moment estimate of λ is.

i) 120

ii) $\frac{1}{24}$

iii) 48

iv) $\frac{1}{120}$

f) Let $X_1, X_2, \ldots X_n$ be a random sample of sizen n taken from H(x, N, M, n) population. Assuming n and N are known consistent estimator of M is

i) $\frac{\overline{X}}{n}$

ii) $\frac{M\overline{X}}{n}$

iii) $\frac{N\overline{X}}{n}$

iv) $\frac{2N\overline{X}}{n}$

g) Let T_1 and T_2 be two unbiased estimators of parameter θ. A statistic T_1 is said to be more efficient than statistic T_2 if

i) $Var(T_1) = Var(T_2)$

ii) $Var(T_1) > Var(T_2)$

iii) $Var(T_1) < Var(T_2)$

iv) $E(T_1) < E(T_2)$

h) Which of the following statements is false

I) Consistency is a large sample property.

II) Cramer Rao Inequality gives lower bound for Var (Statistic)

III) If a statistic T is unbiased estimator of parameter θ then T^2 is unbiased estimator of θ^2.

IV) MLE's are functions of sufficient statistics.

i) (I) and (II)

ii) (II) and (IV)

iii) only (III)

iv) All the above

Q2) Attempt any two of the following: **[16]**

a) State Cramer Rao Inequality. Let $X_1, X_2, \ldots X_n$ be a random sample of size *n* taken from N(θ, θ) distribution. Obtain unbiased and efficient estimator of θ.

b) Explain the method of maximum likelihood for estimating the parameter. Obtain moment estimators of parameters α and β of gamma distribution based on a sample of size *n* drawn from it.

c) Define the following terms:

i) Likelihood function and unbiased Estimator.

ii) Minimum variance unbiased Estimator.

iii) Consistent Estimator.

iv) Sufficient Estimator through Neyman factorization criterion.

Q3) Attempt any four of the following: **[16]**

a) Show that sample mean is unbiased estimator of population mean μ where as sample variance is biased estimator of population variance.

b) Explain the iterative procedure to derive MLE of location parameter μ of Cauchy distribution.

c) Show that the sample mean is unbiased and consistent estimator of parameter P of B(1, p) distribution based on a sample of size *n*.

d) Obtain sufficient estimator of the parameter θ of the population with p.d.f

$$f(x,\theta) = \theta\, x^{\theta-1} \quad ,0<x<1$$
$$\theta>0$$

when a sample of size n is taken from it.

e) Let X_1, X_2, X_3 be observations from p(θ) population and $T = 0.4\,X_1 + 0.2\,X_2 + 0.4\,X_3$. Obtain the relative efficiency of T with respect to $\bar{X}$.

f) Distinguish between estimator and estimate.

ℰℰℰ