18STP07

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION MAY 2022
(Second Semester)

Branch – **STATISTICS**

ESTIMATION THEORY

Time: Three Hours Maximum: 50 Marks

SECTION-A (5 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (5 x 1 = 5)

1. The estimator with _____ bias is called unbiased estimator
   (a) 0 (b) 1
   (c) -1 (d) 2

2. The Cramer Rao lower bound for the variance of unbiased estimator is also known as _____
   (a) MB (b) MP
   (c) MVB (d) BMV

3. The MLE for θ,when $X \sim U(0,\theta)$ is _____
   a) $X_{(0)}$ (b) 1
   (c) -1 (d) $X_{(n)}$

4. _____ distribution does not belong to Exponential family.
   (a) Binomial (b) Poisson
   (c) Normal (d) Cauchy

5. In Interval estimation _____ is called as confidence coefficient
   (a) $1+\alpha$ (b) 1
   (c) $1-\alpha$ (d) α

SECTION - B (15 Marks)
Answer **ALL** Questions
ALL Questions Carry **EQUAL** Marks (5 x 3 = 15)

6 a Write the important properties of estimators.
OR
b Define Minimal Sufficient Statistic.

7 a Find Minimum Variance Bound estimator for the distribution $P_\theta(X)=\theta^t(1-\theta)^{n-t}$, $0<\theta<1$.
OR
b What do you mean by Uniformly Minimum Variance Unbiassed Estimator.

8 a Derive the MLE for Bernoulli Distribution with parameter θ.
OR
b Write a brief note on Modified minimum χ^2 statistic.

9 a Describe briefly about Pitman family of distributions.
OR
b What is Scale invariant estimator?

10 a Define shortest length confidence interval.
OR
b What are unbiased confidence sets?

Cont...

SECTION -C (30 Marks)

Answer **ALL** questions
ALL questions carry **EQUAL** Marks (5 x 6 = 30)

11 a State and Prove Factorization theorem.

OR

b Explain Fishers information Measure.

12 a State and prove Lehmann-Scheffe Theorem.

OR

b Illustrate with an example the Chapman-Robbins inequality.

13 a Find the moment estimators for μ and σ^2 when $X \sim N(\mu,\sigma^2)$.

OR

b Prove that MLE is constant under general conditions.

14 a Show that the Bernoulli distribution $P(1,\theta)$ is a member of Exponential family and also find the complete statistics of θ.

OR

b Derive the posterior distribution of θ in Poisson distribution for gamma prior.

15 a Construct $(1-\alpha)\%$ confidence interval for the parameter θ in Uniform distribution $U(0,\theta)$.

OR

b Construct $(1-\alpha)\%$ confidence interval for ratio of two population variances.

Z-Z-Z END