UNIVERSITY OF THE PUNJAB

B.S. 4 Years Program / Eighth Semester – 2019

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Paper: Statistical Inference-II (Theory)
Course Code: STAT-407 Part – I (Compulsory) **Time: 15 Min. Marks: 10**

ATTEMPT THIS PAPER ON THIS QUESTION SHEET ONLY.
Division of marks is given in front of each question.
This Paper will be collected back after expiry of time limit mentioned above.

Q.1. Encircle the correct option. **(10x1=10)**

1. If T is the MLE of θ and $\varphi(\theta)$ is one to one function of θ, then $\varphi(T)$ is MLE of $\varphi(\theta)$. This is known as the

   a) Asymptotic Normality of MLE

   b) Consistency Property of MLE

   c) Invariance Property of MLE

   d) None of the Above

2. Generally the estimators obtained by the method of moments as compare to Maximum Likelihood estimators are:

   a) Less efficient

   b) More efficient

   c) Equally efficient under certain conditions

   d) Both a) & c) are true

3. In the expression $P(C_1 < \theta < C_2) = 1 - \alpha$. constants C_1 & C_2 are called:

   a) Power limits

   b) Control limits

   c) Confidence limits

   d) All of the Above

4. Which one of the following method provides BLUE of the population parameter(s).

   a) Method of Minimum Chi-square

   b) Method of Maximum Likelihood

   c) Method of Least Squares

   d) Method of Moments

5. $\bar{X} \pm Z_{\alpha/2}\frac{\sigma}{\sqrt{n}}$ is the confidence interval for μ when

   a) $n > 30$

   b) $n < 30$

   c) $n \geq 30$

   d) Value of n does not matter.

P.T.O.

6. Suppose the confidence interval is given by $P(T_1 < \theta < T_2) = 1 - \alpha$. Then $Lenght = T_2 - T_1$ would be Minimum if it is:

a) One sided Confidence Interval

b) Two sided Confidence Interval

c) Central Confidence Interval

d) Non-central Confidence Interval

7. If a Statistical Hypothesis completely specifies the distribution, then it is called:

a) Simple Hypothesis

b) Composite Hypothesis

c) Null Hypothesis

d) Alternative Hypothesis

8. Rejection of Null Hypothesis (H_0) when alternative Hypothesis (H_1) is true , is known as:

a) Type-I Error

b) Type-II Error

c) Correct Decision

d) Wrong Decision

9. Which one of the following is used to find out the Best Critical Region (BCR)?

a) Rao-Blackwell theorem

b) Neyman-Pearson Lemma

c) Cramer-Rao Inequality

d) Neyman-Pearson Factorization theorem

10. The Joint Probability density function of sample variates is called:

a) Power Function

b) Distribution Function

c) Likelihood Ratio

d) Likelihood Function

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B.S. 4 Years Program / Eighth Semester – 2019

Roll No. ....

Paper: Statistical Inference-II (Theory)
Course Code: STAT-407 Part – II **Time: 2 Hrs. 45 Min. Marks: 50**

ATTEMPT THIS (SUBJECTIVE) ON THE SEPARATE ANSWER SHEET PROVIDED

Question No.2. Answer the following. **(4 × 5 = 20)**

a) What is the rational of moment estimation? Under what situation moment estimators and maximum Likelihood estimators are equally efficient?

b) Write down the assumptions and properties of Least Squares Estimation method.

c) Differentiate between Most Powerful and Uniformly Most Powerful Tests.

d) Suppose $X_1, X_2, X_3, \ldots, X_n$ constitutes a random sample from Bernoulli distribution with

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

Obtain the MCS estimator of θ.

Question No. 3. Obtain the MLE of the unknown parameter θ for the following distribution, **(12)**

$$f(x;\theta) = \frac{1}{\Gamma P\, \theta^P}\, x^{P-1} e^{-x/\theta} \qquad ; x > 0$$

Where P is known. Obtain the variance of the estimator and check it for Consistency, Efficiency and Sufficiency.

Question No. 4. State and Prove Neyman-Pearson Lemma. **(10)**

Question No. 5. Define pivotal quantity. Consider a random sample of size "n" from a distribution having p.d.f $f(x;\beta) = \beta e^{-\beta x}$; $x > 0, \beta > 0.$ **(08)**

Find 95% Large sample confidence interval for β.