JBF-003-1171003 Seat No. _____

M. Sc. (Statistics) (Sem. I) (CBCS) Examination

December – 2019

MS-103 : Statistical Inference & Non Parametric Tests

Faculty Code : 003
Subject Code : 1171003

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions :
(1) Attempt all questions.
(2) Each question carries equal marks.

1 Answer the following questions. (Any seven) **(14)**

1. Explain prior distribution.
2. Define Factorization theorem for sufficiency.
3. Prove that an unbiased estimator is not necessarily unique.
4. Write properties of Minimum Chi – Square test.
5. Which distribution is derive from Gamma distribution? Write its parameters.
6. Define Non – Randomized test.
7. Explain power of a test.
8. Write down p.d.f of one parameter exponential family distribution.
9. Explain size of test.
10. What is meant by minimal complete class of decision rule.

2 Answer the following questions. (Any two) **(14)**

1. Explain Generalized Neyman Pearson Lemma.
2. Define : (i) Kruskal – Wallis Sample tests.
   (ii) Sign test
   (iii) Linear Rank Statistics
3. Explain Monotone likelihood ratio and UMP test.

3 Answer the following questions. **(14)**

1. Let X be point binomial variants with parameter p. Let p = {1/4 , ½} and A= {a1, a2}. Let the loss function be given by the following table.

L(a, θ)	a1	a2
p= 1/4	1	4
p=1/2	3	2

   Obtain minimax decision rule.
2. State and prove Rao-Blackwell theorem.

OR

3 Answer the following questions. **(14)**

1. State and Prove Cramer-Rao Inequality.
2. Show that if MVUE exist it is unique.

4 Answer the following questions. (Any two) **(14)**

1. Define: (i) completeness (ii) complete sufficient statistics. Show that Poisson distribution is complete.
2. Draw the following problem using Mann-Whitney U – test.
   Scores (X):- 10, 13, 12,15,16,8,6
   Scores (Y):-20, 14,7,9,17,18,19,25,24
3. Discuss two sample problem and how we can use Wilcoxon two sample rank sum test in two sample problem.

5 Answer the following questions. (Any Two) **(14)**

1. Investigate the significance of the difference between an observed Distribution and specified population distribution.

$$f(x) = \frac{e^{-\lambda}\lambda^{x}}{x!} where \lambda = 7.6 \; and n = 3366$$

   X: 5 14 24 57 111 197 278 378 418 461 433 413 358 219.
2. Discuss all properties of M.L.E and find M.L.E of p for binomial distribution.
3. State and prove Neyman-person fundamental lemma.
4. Define the terms: (i) Consistency and (ii) Sufficiency. Give one example of each.