HEI-003-1171003 Seat No. ________

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

November / December – 2017

MS-103 : Statistical Inference & Nonparametric Test

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) Define Consistency.

(2) Define Non-Randomized test.

(3) Show that Binomial distribution is family of one parameter exponential distribution.

(4) Write properties of Minimum Chi-Square test. Prove that an unbiased estimator is not necessarily unique.

(5) Which distribution is derive from Gamma distribution ? Write its parameters.

(6) Write p.d.f. of normal distribution.

(7) Explain size of test.

(8) Which nonparametric test is used to find difference between more than two means ?

(9) Explain posterior distribution.

2 Answer the following questions : (any **two**) **14**

(1) Prove Lehman – Scheffe's theorem.

(2) Show that if MVUE exists, it is unique.

(3) Let $x_1, x_2, ...x_n$ be a random sample from $U(0, \theta) \theta > 0$ obtain UMVUE.

3 Answer the following questions : **14**

(a) Explain comparison of χ^2 and K-S test.

(b) Explain Bhattacharya's lower bound.

OR

3 Answer the following questions : **14**

(1) 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

(2) If $\delta \in D^*$ is a Bays decision rule w.r.to a prior $\pi o \in \Omega^*$ and sup $R(\delta o, \theta) \leq r(\delta o, \pi o)$ than (I) δo is also a minimax solution (II) πo is a least favorable prior distribution.

4 Answer the following questions : (any **two**) **14**

(1) Let $X \sim \frac{1}{\theta} e - \frac{x}{\theta}$ and $X_1, X_2 \ldots X_n$ be a random variable from the given distribution. Obtain Rao-Blackwell statistics for θ.

(2) Define following terms : UMP – Test, One Parameter Exponential Family, Bayes Risk.

(3) Let X be point binomial variants with parameter p. Let p = {1/4, 1/2} and A={a_1, a_2}. Let the loss function be given by the following table :

$L(a,\theta)$	a_1	a_2
$p=1/4$	1	4
$p=1/2$	3	2

Obtain minimax decision rule.

5 Answer the following questions : (any **two**) **14**

(1) State and Prove Cramer – Rao lower bound.

(2) Explain Neyman – Pearson's fundamental lemma.

(3) Investigate the significance of the difference between an observed distribution and specified population distribution.

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

X: 5 14 24 57 111 197 278 378 418 461 433 413 358 219.

(4) Let $x_1, x_2, \ldots\ldots x_n$ be a random sample from Poisson (θ) obtain UMP test of $H_0 : \theta \geq \theta_0$ Vs. $H_1 \, \theta < \theta_0$ of size α.