Roll No. ....

41255

B. Sc. (Hons.) Mathematics 4th Semester Examination – May, 2019

ELEMENTARY INFERENCE

Paper : BHM245 Opt-i

Time : Three hours] *[Maximum Marks : 60*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt ***five*** questions in all, selecting ***one*** question from each Section. Question No. 9 (Unit – V) is ***compulsory***.

UNIT – I

1. (a) Define Parameter and Statistic. Also define sampling distribution and standard error of estimate.

   (b) For the geometric distribution, $f(x, \theta) = \theta(1-\theta)^{x-1}$, $x = 1, 2, \ldots\ldots, 0 < \theta < 1$. Obtain an unbiased estimator of $\frac{1}{\theta}$.

P. T. O.

2. (a) Let $\{T_n\}$ be a sequence of estimators such that for all $\theta \in \Theta$:

(i) $E_\theta(T_n) \to r(\theta)$ as $n \to \infty$

(ii) $\text{var}_\theta(T_n) \to 0$ as $n \to \infty$

Then T_n is a consistent estimator of $r(\theta)$.

(b) A random sample $(X_1, X_2, X_3, X_4, X_5)$ of size 5 is drawn from a normal population with unknown mean μ. consider the following estimators to estimate μ :

(i) $t_1 = \dfrac{X_1 + X_2 + X_3 + X4 + X_5}{5}$

(ii) $t_2 = \dfrac{X_1 + X_2}{2} + X_3$

(iii) $t_3 = \dfrac{2X_1 + X_2 + \lambda \times X_3}{3}$ where λ is such that t_3 is an unbiased estimator of μ. Find λ. Are t_1 and t_2 unbiased ? State giving reasons, the estimator which is best amoung t_1 , t_2 and t_3.

UNIT – II

3. (a) Find the maximum likelihood estimate for the parameter λ of a Poisson distribution on the basis of a sample of size n. Also find its variance.

(b) Explain the following Terms

(i) Null hypothesis and alternative hypothesis

(ii) Type I and Type II errors

4. (a) State and prove Neyman - pearson lemma

(b) Let x_2 $N(\mu, u)$, μ unknown. To test $H_0 : \mu = -1$ against $H_1 : \mu = 1$, based on a sample of size 10 from this population, we use the critical region division. Are these figures commensurate with the general examination result which is in the ratio of 4:3:2:1 for various categories respectively ?

(b) A die is thrown 60 times with following results :

Face	1	2	3	4	5	6
Frequency	8	7	12	8	14	11

Test at 5 % level of significance if the die is unbiased, assuming that $P(\chi^2 > 11) = 0.05$ with 5 d.f.

8. (a) The mean weekly sales of soap bars in departmental stores was 146.3 bars per store. After an advertising the mean weekly sales in 22 stores for a typical week increased to 153.7 and showed a standard deviation of 17.2 was the advertising campaign successful ?

(b) Write a short note on "Anova for one way classified data.

UNIT – V

9. (a) Write a short note on Efficiency.

(b) Write a short notes on Sufficiency.

(c) Write a short note on *one* tailed and *two* tailed tests.

(d) Define level of significance.

(e) Write a short note on estimation of a single proportion.

(f) Write a short note on Analysis of variance two way classified data.