[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4024 **H**

Unique Paper Code : 2362572401

Name of the Paper : NEP-UGCF : Statistical Inference

Name of the Course : **B.A. (Program)**

Semester : IV

Duration : 3 Hours Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **five** questions.
3. Each questions carry equal marks.

1. (i) Consistent estimator. (3)

   (ii) Degree of freedom. (3)

P.T.O.

(iii) One tailed and two tailed test. (2)

(iv) Factorization theorem of sufficiency. (2)

(v) Level of significance and Power of the test. (2)

(vi) Goodness of fit test. (2)

(vii) Applications of t-distribution. (2)

(viii) p-value. (2)

2. (a) Explain various types of sampling. (6)

(b) Explain the concept of efficient and sufficient estimators. Also, find the sufficient statistic for the population mean (μ) and variance (σ^2) in case of normal population $N(\mu, \sigma^2)$. (12)

3. (a) Explain minimum variance biased estimator. (6)

(b) Let $X_1, X_2, \ldots, X_n$ be a random sample from a distribution with pdf

$$f(x,\theta)=\frac{1}{\theta}e^{\frac{x}{\theta}}, \quad x>0, \ \theta>0$$

Find the maximum likelihood estimator for θ. Is the estimator unbiased? (12)

4. (a) Discuss the concept of interval estimation and provide suitable illustration. (6)

(b) For the following distribution

$$f(x,\theta)=\frac{2}{\theta^2}(\theta-x),\quad 0\le x\le\theta,$$

Obtain $100(1-\alpha)\%$ confidence interval for θ. (12)

5. (a) What is simple and composite statistical hypothesis? Give example. Define Null and alternative hypothesis. (6)

(b) Explain the concept of Type-I and Type-II Errors. Show that the most powerful test is necessarily unbiased. (12)

6. (a) Define "Likelihood ratio test". Under what circumstances would you recommend this test. (6)

(a) Obtain $100(1-\alpha)\%$ confidence interval for the binomial distribution, $\alpha = 0.05$. (12)