(b) Let $x_1, x_2, \ldots\ldots x_n$ be a random sample from the uniform distribution with pdf. 6

$$f(x,\theta)=\frac{1}{\theta}, 0<x<\theta, \theta>0$$

0, otherwise.

Obtain MLE for θ

7. (a) given one observation from a population with pdf $f\ (x,\theta)=\frac{2}{\theta^2}(\theta-x);\ 0\le x\le\theta$ obtain $100\ (1-\alpha)\%$ confidence interval for θ. 7

(b) Let $f(x,\theta)=\frac{1}{\theta}; 0\le x\le\theta$ and that you are testing H_0: θ = 1 against H_1 : θ = 2 by means of a single observation. What would be the values of type-1 error and type-II for the critical region $x\ge0.5$. 5

8. (a) Obtain MLE of θ in $f(x,\theta)=(1+\theta)x^{\theta}, 0<x<1$ based on independent sample of size n. Examine whether this estimate is sufficient for θ. 7

(b) Let X follow $N(\mu,\sigma^2)$ where σ^2 is known. Obtain $100(1-\alpha)\%$ confidence interval for μ. 5

11/12/17 (B)

[This question paper contains 4 printed pages]

Your Roll No. : ....

Sl. No. of Q. Paper : **8001** **HC**

Unique Paper Code : 62374311

Name of the Course : **B.A.(Programme) Statistics**

Name of the Paper : Theory of Statistical Inference

Semester : III

Time : 3 Hours ***Maximum Marks : 75***

Instructions for Candidates :

(a) Write your Roll No. on the top immediately on receipt of this question paper.

(b) Attempt **Six** questions in **all**.

(c) Question **NO.1** is compulsory. Attempt **five** more questions.

(d) Simple calculator can be used.

1. (a) Indentify **True/False** : 1×6

(i) The sum of independent chi-square variate is also a chi-square variate.

(ii) For t-distribution, $\gamma_1=0$

(iii) If T is an unbiased estimator of parameter θ, then $E(T)=2\theta$

(iv) $1-\beta$ is called the power of the test hypothesis where β is the probability of type-II error.

P.T.O.

(v) For normal distribution sample median is more efficient that sample mean for large samples.

(vi) Mode of chi-square distribution with nd.f.=n-3.

(b) Explain the following terms : 3×3

(i) Simple and Composite Hypothesis

(ii) Level of Significance

(iii) Ney man – Pearson Lemma

2. (a) The standard deviation of a population is 2.70 cms. Find the probability that in a random sample of size 66 6

(i) Sample mean will differ from the population mean by 0.75 cm or more

(ii) Sample mean will exceed the population mean by 0.75 cm or more

(Given that the value of the standard normal probability integral from 0 to 2.25 is 0.4877)

(b) Derive the M.G.F. of Chi-Square Distribution. 6

3. (a) Let X have pdf $f(x,\theta)=\theta^{x}(1-\theta)^{1-x}\ x=0,1$

0 otherwise

Let $X_1, X_2, \ldots\ldots X_n$ be a random sample from the above population.Obtain sufficient statistics. 6

(b) For a Chi-Square distribution with n d.f. establish the following recurrence relation between the moments : 6

$$\mu_{r+1}=2r(\mu_r+n\mu_{r-1}), r\geq 1$$

Hence find β_1 and β_2.

4. (a) The mean weekly sales of soap bars in departmental stores was 146.3 bars per store. After an advertising campaign 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 ? 6

(b) Write properties of Maximum Likelihood Estimators. 6

5. (a) Define MVU estimator. Show that MVUE is unique. 6

(b) The heights of 10 males of a given locality are found to be 70,67,62,68,61,68, 70,64,64,66 inches. Is it reasonable to believe that the average height is greater than 64 inches ? Test at 5% significance level assuming that for 9 degrees of freedom P(t>1.83)=0.05. 6

6. (a) In one sample of 8 observations, the sum of the squares of deviations of the sample values from the sample mean was 84.4 and in other sample of 10 observations it was 102.6. Test whether this difference is significant at 5% level, given that the 5% point of F for nl=7 and n2=9 degrees of freedom is 3.29. 6