Reg. No ..... Name **21U434S**

B Sc DEGREE END SEMESTER EXAMINATION - JULY 2021

SEMESTER 4 : MATHEMATICS

COURSE : **19U4CPSTA04 / 19U4CRSTA04 : STATISTICAL INFERENCE**

(For Supplementary - 2018/2017/2016 Admissions)

Time : Three Hours Max. Marks: 75

PART A

Maximum marks from this part is 10

1. What are the desirable properties of a good estimator?
2. Which method of estimation is based on Cramer-Rao inequality
3. For the distribution f(x) = $\frac{1}{\theta}\ e^{-\frac{x}{\theta}}$; $0 < x < \infty,\ 0 < \theta < \infty$ an unbiased estimator of θ is ------
4. If 2.4,3.6,7.8,4.2,5.6,9.3,7.4,1.8,3.9 is a random sample taken from a uniform distribution defined over (a,b), find the maximum likelihood estimates of 'a' and 'b'
5. The diameter of cylindrical rod is assumed to the normal with a variance of 0.04 cm. A sample of 50 rods has a mean diameter of 4.5 cm. Find the 95% confidence limits for population mean
6. Which hypothesis decides whether a test is one tailed or two tailed?
7. Define statistical hypothesis
8. Wrtie down the test statistic for testing $H_0 : \sigma = \sigma_0$
9. A sample of 12 specimen taken from a normal population is expected to have a mean =50. The sample has mean 64 with a variance 25. . Write the test statistic for testing, $H_0 : \mu = \mu_0\ \ H_1 : \mu \neq \mu_0$.
10. Write the null hypohesis in analysis of variance with one-way classification.

(1 x 10 = 10)

PART B

Maximum marks from this part is 15

11. Define estimation. Distinguish between Estimators and estimates.
12. Obtain a suficient estimator for λif X~Poisson (λ)
13. A sample of size 9 from a normal population give mean= 15.8 and variance =10.3. Find 99% confidence limits for the population mean.
14. 150 heads and 250 tails resulted from 400 tosses of a coin find 90% confidence interval for the proportion of head
15. Distinguish Type I error and Type II error
16. What is the context under which paired sample t test is used?
17. Explain how you will obtain a one-way classified data.

(3 x 5 = 15)

PART C

Maximum marks from this part is 20

18. Obtain a sufficient estimator for μ and σ in X follows N(μ, σ)
19. A random sample of size 16 obtained from a normal population with mean μ and variance 6.25 is 23.6, 28.1, 27.2, 21.0, 27.8, 25.1, 22.5, 18.4, 31.1, 30.0, 26.3, 20.6, 24.4, 25.0, 19.6, 22.2 . Determine (1) a point estimate for μ (2) a 99% confidence interval for μ

20. Obtain a 95% confidence interval for the mean of normal distribution with standard deviation 4 based the sample values 2.4,3.8,2.6,4.4,5.9,1.8,6.4,3.7.

21. Let p be the proportion of tea drinkers in Kerala. If a random sample of 1234 Keralites yielded 789 tea drinkers, find 95% confidence interval of p

22. Explain (i) simple and composite hypothesis (ii) critical and acceptance regions of a test (iii) significance level and power of a test

23. Obtain the chi-square test statistics for a 2x2 contingency table for testing the independence?

(5 x 4 = 20)

PART D

Maximum marks from this part is 30

24. The following table gives the number of mistakes per page observed in a book which follows Poisson distribution. Find an unbiased and consistent estimate of its parameter λ. Estimate its variance

No. of mistakes	0	1	2	3	4
No. of pages	211	90	19	5	0

25. Explain the two sample t-test. The daily wages(in Rs.) of some randomly selected workers from two firms of the same type are given below. On the basis of the samples, can it be concluded that the mean wages of the workers of the two firms are the same. Assume that the wages follows Normal distribution

Sample I : 300, 350, 280, 320, 260, 340

Sample II : 260, 400, 340, 280, 360, 350, 150, 280

26. Fit a binomial distribution and test the goodness of fit.

X :	0	1	2	3	4	5	6
f :	105	80	43	30	26	9	7

27. What is ANOVA ? Write the assumptions. Following are the weekly sales records of three sales man A, B, and C of a company . Test whether the sales of three salesman are different , α =0.05

A	300	400	300	500	
B	600	300	300	400	
C	700	300	400	600	500

(10 x 3 = 30)