Reg. No…….. Name…… **21U432-S**

B. Sc. DEGREE END SEMESTER EXAMINATION – JULY 2021

SEMESTER – 4: STATISTICS (COMMON FOR MATHEMATICS AND COMPUTER APPLICATIONS)

COURSE: 15U4CPSTA4-15U4CRCST4, STATISTICAL INFERENCE

(Common for Improvement 2018 admission / Supplementary 2018/2017/2016/2015 admissions)

Time: Three Hours Max. Marks: 75

(Use of Scientific calculators and Statistical tables permitted)

PART A

Answer all questions. Each question carries 1 mark.

1. Define one tailed test.
2. What are the criteria for good estimator?
3. Define p value of a test.
4. State the Cramer- Rao inequality.
5. What is the null hypothesis in one way ANOVA?
6. If there are 18 observations for a paired t test, then d.f of the test statistic is……
7. Find an unbiased estimator of p in B(1,p)
8. Which distribution is used for constructing 100 (1-α) % C.I for σ^2 for a random sample from N(μ, σ^2).
9. Obtain the MLE based on a sample of size n for a Poisson population with parameter λ.
10. Give a test statistic for testing the hypothesis that $H_0 : P_1 = P_2$ against $H_1 : P_1 \neq P_2$, where P denotes the proportion in a population.

PART B

Each question carries 3 marks. Maximum marks from this part is 15

11. Explain the steps for finding the confidence limits for the population.
12. Differentiate between standard error and standard deviation.
13. Explain power of a test. How it influences a statistical test.
14. Show that sample mean is an unbiased estimate of the population mean of N(μ, σ).
15. Describe the method of moments.
16. Distinguish between type I and type II errors.
17. A sample of 900 members is found to have a mean of 3.4 cm. Can it be reasonably regarded as a simple sample from a large population with mean 3.25 cm and s.d 2.61 cm.

PART C

Each question carries 5 marks. Maximum marks from this part is 20

18. Explain
    a) Simple and composite hypothesis.
    b) Null and alternative hypothesis.
    c) Parametric and nonparametric hypothesis.

19. A r.v has p.d.f $f(x)=(1+\theta)x^{\theta}, 0<x<1, \theta>0$. The sample values from this population are: 0.46 0.38 0.61 0.82 0.59 0.53 0.72 0.44 0.59 0.60. Find the estimate of θ by method of moments and maximum likelihood estimate.
20. Explain the concept of method of minimum variance.
21. If $x_1, x_2, \ldots, x_n$ are random observations on a Bernoulli's variate X taking the value 1 with probability p and the value 0 with probability 1-p, Show that $\frac{t(t-1)}{n(n-1)}$ where $t=\sum_i X_i$ is an U.E
22. Explain Mann-Whitney u-test.
23. If T is an unbiased estimator for parameter θ, show that T^2 is not an unbiased for θ^2.

PART D

Each question carries 10 marks. Maximum marks from this part is 30 .

24. Obtain sufficient estimators of μ , when σ is known and of σ, when μ is known, for a random sample $X \sim N(\mu, \sigma^2)$
25. a) Explain testing of Independence of two attributes using Chi-square statistic.
    b) The S.D of two samples of sizes 10 and 14 from two normal populations are 3.5 and 3.0 respectively. Examine whether the S.D's of the populations are likely to be equal.
26. Among 64 off springs of a certain cross between gunea pigs, 34 were red, 10 were black and 2 were white. According to the gentle model these numbers should be in the ratio 9:3:4. Are the data consistent with the model at the 5% level?
27. Consider the following table,

Cereals	A	9.3	10.8	8.4	9.7	9.5	7.9	9.5
	B	13.4	12.2	12.4	12.8	12.2		
	C	12.5	14.7	12.9	11.8			
	D	14.0	15.6	14.1				

Is there enough evidence to conclude that there are differences in crunchiness between the four cereals?

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