K19U 0598

Reg. No.: ....

Name: ....

IV Semester B.Sc. Degree (CBCSS – Reg./Supp./Imp.) Examination, April 2019 (2014 Admission Onwards) Complementary Course in Statistics for Mathematics/ Computer Science 4C04STA – STATISTICAL INFERENCE

Time : 3 Hours Max. Marks : 40

Instruction : Use** of calculators and statistical tables are **permitted.

PART – A
(Short Answers)

Answer **all** the **six** questions. **(6×1=6)**

1. Define sampling distribution.
2. What is the mean and variance Chi-square distribution with 2 degrees of freedom ?
3. Define efficiency of an estimator.
4. Define :
   a) Parameter b) Statistic.
5. What is composite hypothesis ? Give an example.
6. State Neymann Pearson Lemma.

PART – B
(Short Essay)

Answer **any 6** questions. **(6×2=12)**

7. Define F distribution. Give the inter relationship between t, Chi-square and F distribution.
8. Write the moment generating function of Chi-square distribution and state the reproductive property of Chi-square distribution.

P.T.O.

9. Define unbiasedness. A random sample (X_1, X_2, X_3) is drawn from N (μ , σ).

   Obtain the value of λ if $t = \frac{2X_1 + X_2 + \lambda X_3}{3}$ is unbiased for μ .

10. Obtain the maximum likelihood estimator of θ in the population given

    $f(x) = (1+\theta)x^{\theta} \quad 0 \le x \le 1, \theta > 0$.

11. Derive interval estimate of the difference of two population means, when σ_1, σ_2 unknown.

12. Explain Type I error and Type II error.

13. What is paired t-test ? What are the assumptions on t test ?

14. Distinguish between simple and composite hypothesis. Give one example each.

PART – C

(Essay)

Answer **any 4** questions. **(4×3=12)**

15. Define t-distribution and point out any two characteristics of t-distribution.

16. Let X_1, X_2, X_3, ..., X_n are i.i.d. P (λ) random variables. Derive a sufficient statistic for λ .

17. Determine 100 (1 – α)% confidence interval for $\mu_1 - \mu_2$ if samples are taken from two normal populations with :

    $\overline{X}_1 = 20, \overline{X}_2 = 16, \sigma_1^2 = 9, \sigma_2^2 = 16, n_1 = 30, n_2 = 50$.

18. A random sample of size 15 from a normal population gives sample mean is 3.2 and sample variance is 4.24. Determine the 95% confidence limits for σ^2.

19. Explain the procedure for testing equality of population proportions based on large samples.

20. Distinguish between large sample test and small sample test.

PART – D
(Long Essay)

Answer **any 2** questions. **(2×5=10)**

21. Derive the sampling distribution of variance.

22. Derive confidence interval for population mean μ when (i) σ_1, σ_2 known (ii) σ_1, σ_2 unknown.

23. Two samples are drawn from two normal populations. Based on the data test whether the two populations have

    a) the same mean

    b) the same variance

Sample I :	4.0	4.4	3.9	3.9	4.0	4.2	4.4	5.0	4.8	4.6
Sample II :	5.3	4.3	4.1	4.4	5.3	4.2	3.8	3.9	5.4	4.6

24. Discuss briefly the different applications of chi-square as a test statistic.