



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 $N(\mu, \sigma)$. 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 $f(x) = (1+\theta)x^\theta$ $0 \leq x \leq 1, \theta > 0$.
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 $X_1, X_2, X_3, \dots, X_n$ are i.i.d. $P(\lambda)$ random variables. Derive a sufficient statistic for λ .
17. Determine 100 $(1 - \alpha)\%$ confidence interval for $\mu_1 - \mu_2$ if samples are taken from two normal populations with :
 $\bar{X}_1 = 20, \bar{X}_2 = 16, \sigma_1^2 = 9, \sigma_2^2 = 16, n_1 = 30, n_2 = 50$.
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.