K22U 1766

IV Semester B.Sc. Degree (CBCSS – Supplementary)
Examination, April 2022
(2016 – 18 Admissions)
COMPLEMENTARY COURSE IN STATISTICS
4C04STA : Statistical Inference

Time : 3 Hours

Max. Marks : 40

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

PART – A
(Short Answer)

Answer **all** questions.

$(6 \times 1 = 6)$

1. Define the term 'Standard error'.
2. State the relationship between mean and variance of a chi-square distribution.
3. Define a sufficient estimator.
4. Give an example of an estimator which is consistent but not unbiased.
5. State the invariance property of maximum likelihood estimators.
6. What do you mean by confidence estimation ?

PART – B
(Short Essay)

Answer **any 6** questions.

$(6 \times 2 = 12)$

7. Obtain the sampling distribution of the mean of a random sample taken from $N(\mu, \sigma^2)$.
8. State the relationships between chi-square, t and F distributions.
9. What are the desirable properties of a good estimator ?
10. Find a sufficient estimator of λ based on a random sample taken from Poisson distribution with parameter λ.
11. What are the properties of maximum likelihood estimators ?
12. Obtain the 95% confidence interval for the population proportion.
13. Define the two types of errors in statistical hypotheses.
14. Distinguish between significant level and power of a test.

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PART – C
(Essay)

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

15. Find the m.g.f. of chi-square distribution with n degrees of freedom.

16. If $X \sim F(m, n)$, then find the distribution of $\frac{1}{X}$.

17. Obtain the 95% confidence interval for the difference of two population means.

18. Explain one-tailed and two-tailed tests of hypothesis.

19. Explain goodness of fit.

20. The records of a certain hospital showed that the birth of 723 males and 617 females in a certain week. Does these confirm to the hypothesis that proportions of male and female are equal at 5% level ?

PART – D
(Long Essay)

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

21. A sample of 100 tyres is taken from a lot. The mean life of tyres is found to be 39.35 km with a standard deviation of 3.26 km. Obtain the 99% confidence limits for the mean life of tyres.

22. State Neyman-Pearson lemma. Obtain the most powerful level α test for testing $H_0 : \mu = \mu_0$ against $H_1 : \mu = \mu_1$, $\mu_1 < \mu_0$ using a random sample of size n taken from $N(\mu, \sigma^2)$, where σ^2 is known.

23. A die is thrown 180 times. The following results were obtained.

Number turning up	1	2	3	4	5	6
Frequency	25	35	40	22	32	26

Test whether the die is unbiased.

24. The following data relate to additional hours of sleep gained by 5 patients with a certain drug.

Patient	1	2	3	4	5
Hours gained	0.8	– 1.0	– 0.1	1.3	2.1

Test the claim that the drugs produces additional sleep.

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