TB214190W

Reg. No :...............................

Name :.................................

B.Sc. DEGREE (C.B.C.S.) EXAMINATION, MARCH 2023

(2021 Admissions Regular, 2020 Admissions Supplementary / Improvement, 2019 &2018 Admissions Supplementary)

SEMESTER IV - COMPLEMENTARY COURSE 1 (STATISTICS)

ST4C01B18 - STATISTICAL INFERENCE

(For Mathematics & Physics)

Time : 3 Hours

Maximum Marks : 80

Part A

I. Answer any Ten questions. Each question carries 2 marks **(10x2=20)**

1. Define F statistic. Give an example.
2. Write the sampling distribution of the variance of a sample taken from a normal population N(μ,σ).
3. What is Neyman's condition for sufficiency?
4. What do you mean by interval estimation?
5. What is meant by confidence coefficient in interval estimation?
6. Obtain the moment estimate of p in the case of binomial population with parameters N and p where N is known.
7. Distinguish between statistic and test statistic
8. Whether a test is one – tailed or two – tailed depends on the ....hypothesis.
9. What is critical region in testing of hypothesis?
10. What is the reason for keeping the significance level at a lower level in testing of hypotheses?
11. Write down the test statistic used for testing the independence of two attributes in a 2x2 contingency table.
12. Explain the procedure for testing equality of means of two normal populations.

Part B

II. Answer any Six questions. Each question carries 5 marks **(6x5=30)**

13. Write down the inter relationships between normal, t, chi square and F statistics.
14. Derive MGF of Chi square Distribution.
15. Obtain the interval estimate of the mean of a normal population N(μ ,σ) when (i) σ is known and (ii) σ is unknown
16. Show that if T is unbiased estimate of θ, T^2 is not an unbiased estimate of θ^2
17. Find the M.L. estimate of λ based on a sample taken from the population with p.d.f. f(x) = $\frac{\lambda^x}{x!}e^{-\lambda}$, x = 0, 1, 2, ...
18. Explain the concept of best critical region with reference to testing a simple null hypothesis against a simple alternative hypothesis
19. Let p be the probability of getting head in the single toss of a coin. Suppose that we want to test H_0: p = 0.5 against H_1: p = 0.25. The coin is tossed 6 times and H_0 is rejected if less than 2 heads are obtained. Find the power of the test.
20. Explain paired t – test.
21. A sample from a population is 7, 4, 6, 11, 20, 8, 10, 6, 13, 11 and 9. Can it be regarded as a sample from a normal population with S.D 3.

Part C

III. Answer any Two questions. Each question carries 15 marks **(2x15=30)**

22. (a) Derive the sampling distribution of means of samples taken from a normal population $N(\mu,\sigma)$. (b) A sample of size 16 is taken from a normal population with mean 1 and standard deviation 1.5. Find the probability that the sample mean is negative.

23. A random sample of size 16 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, and 22.2. Determine (i) a point estimate for μ and (ii) 99% confidence interval for μ

24. Obtain the best critical region for the population $f(x,\theta) = \theta e^{-\theta x}$, $x \geq 0$ of size $\propto$ for testing $H_0: \theta=\theta_0$ against $H_1 : \theta = \theta_1$

25. (a) Derive the expression of χ^2 -test of independence in a 2×2 contingency table. (b) From the following data test whether the colour of the son's eye is associated with that of the father.

Father's eye colour	Son's eye colour	
	Light	Not light
Light	471	151
Not light	414	230

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