TB244383M

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

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

BACHELOR'S DEGREE (C.B.C.S) EXAMINATION, MARCH 2024

2022 ADMISSIONS REGULAR

SEMESTER IV - Complementary for Maths & Physics

ST4C01B18 - Statistical Inference

Time : 3 Hours

Maximum Marks : 80

Part A

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

1. Find the mean of the chisquare distribution with n degrees of freedom.
2. Distinguish between parameter and statistic
3. Explain the method of minimum variance.
4. Based on a set of sample values 1, 5, 3, 4, 7 obtain a moment estimate of the parameter of Poisson distribution.
5. State Cramer Rao inequality.
6. Show that sample mean is an unbiased estimate of the population mean.
7. Why there must be errors in testing of hypothses?
8. Define critical region
9. What is meant by most powerful test.
10. What is the relation between power of the test and Type 2 error?
11. Define p – value in testing of hypothesis.
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. A sample of size 16 drawn from a Normal population has variance 5.76. Find c such that $P[\,|\bar{X} - \mu| < c\,] = 0.95$, where $\bar{X}$ is the sample mean and μ is the population mean.
14. Define F distribution. Also derive a statistic following F distribution.
15. Obtain the M.L.E. for θ if $f(x, \theta) = \frac{1}{\theta}$, $0 \leq x \leq \theta$
16. 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, ...
17. Find the Cramer- Rao lower bound for the variance of any unbiased estimator of λ where λ is parameter of a Poisson population.
18. Explain the concept of best critical region with reference to testing a simple null hypothesis against a simple alternative hypothesis
19. What is meant by the test of statistical hypothesis? What are the principle steps involved in statistical test.
20. Five plants of particular variety show annual growths of 1.9, 1.1, 2.7, 1.6 and 2.0 ft. Test whether the variance of the population is less than 0.25.
21. How will you calculate the degrees of freedom in a chi square test of goodness of fit?

Part C

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

22. Derive the distribution of $t = \dfrac{\bar{x}_1 - \bar{x}_2 - (\mu_1 - \mu_2)}{\sqrt{\dfrac{n_1 s_1^2 + n_2 s_2^2}{n_1 + n_2 - 2}\left(\dfrac{1}{n_1} + \dfrac{1}{n_2}\right)}}$, where $\bar{x}_1$ and $\bar{x}_2$ are the means, s_1^2 and s_2^2 are the variances of random samples of sizes n_1 and n_2 from two Normal populations with the same but unknown variance σ^2.

23. If 8.6, 7.9, 8.3, 6.4, 8.4, 9.8, 7.2, 7.8, 7.5 are the observed values of a random sample of size 9 from N (μ,σ). Derive & Estimate 95% confidence interval for μ and σ2

24. Suppose a random sample of size n is taken from a Poisson population with p.d.f. $f(x) = e^{-\lambda} \lambda^x / x!$, x = 0,1,2..... Give the most powerful critical region of size α for testing $\lambda = \lambda_0$ against $\lambda = \lambda_1$ where $\lambda_1 > \lambda_0$

25. The random samples were drawn from two normal populations and the following results were obtained Sample I 16 17 18 19 20 21 22 24 26 27 Sample II 19 22 23 25 26 28 29 30 31 32 35 36 Test whether the two populations have the same mean or not?