21100923

QP CODE: 21100923

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) EXAMINATION, MARCH 2021

Fourth Semester

Complemetary Course - ST4CMT04 - STATISTICS - STATISTICAL INFERENCE

(Common for B.Sc Computer Applications Model III Triple Main, B.Sc Mathematics Model I, B.Sc Physics Model I)

2017 Admission onwards

F59F53DF

Time: 3 Hours Max. Marks : 80

Part A

*Answer any **ten** questions.*

*Each question carries **2** marks.*

1. Differentiate between point estimation and interval estimation.
2. How can you define relative efficiency?
3. Define efficiency.
4. How can we estimate the parameters using the method of maximum likelihood?
5. What is the method of minimum variance?
6. Obtain the maximum likelihood estimator of the parameter θ of Uniform distribution U(0,θ)
7. Obtain the confidence interval for the variance of Normal population.
8. What do you mean by a statistical hypothesis?
9. Define p- value.
10. For a population with p.d.f $f(x) = (1+\theta)\, x^{\theta};\ \ \theta > 0,\ 0 \leq x \leq 1$,and zero elsewhere, the hypothesis H_0: θ = 1 is to be tested based on a single observation taken from the population. It is suggested to reject the hypothesis if the observation x is less than 0.6. Find the power of the test if H_1: θ = 1.5 is the alternate hypothesis.
11. Write down the test statistic for testing the equality of means of two populations when the population SDs (1) σ_1 and σ_2 are known (2) σ_1 and σ_2 are unknown.

12. Give the test statistic in the case of small sample test to test the equality of means of two normal populations, (1) when population SDs are known (2) when population SDs are unknown.

(10×2=20)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. x_1 and x_2 are two independent observations from a population with mean μ and variance σ^2. If $t_1 = \frac{x_1+x_2}{2}$ and $t_2 = \frac{2x_1+3x_2}{5}$, compare the efficiencies of t_1 and t_2.
14. Obtain a sufficient estimate of μ of N(μ,σ), when σ is known.
15. Derive the confidence interval for the mean of normal population.
16. A random sample of 500 pineapples was taken from a large consignment and 65 were found to be bad. Find 99% and 95% confidence intervals for the proportion of bad pineapples.
17. The average hourly wage of a sample of 150 workers in a factory A was Rs. 25.6 with SD of Rs.1.08. The average hourly wage of a sample of 200 workers in a factory B was Rs. 28.7 with SD of Rs. 1.28. Find 99% and 95% confidence intervals for the difference of means.
18. A sample of 900 items is found to have a mean of 3.41 gms. Can it be reasonably regarded as a random sample from a large population whose mean is 3.21 gms and SD 2.63 gms.
19. Explain the procedure for testing goodness of fit.
20. The standard deviation of a sample of 15 from a normal population was found to be 7. Examine whether the hypothesis that the standard deviation is more than 7.6 is acceptable.
21. A random sample of 8 pigs fed on diet A over a period gave mean value as 6 and SD 3.8. Another sample of 5 pigs fed on diet B gave the mean value as 9 and SD 4.15. Test whether the diets A and B differ significantly in their variances.

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **15** marks.*

22. (1) State and prove a sufficient set of conditions for the consistency of an estimate.
(2) Show that if T is an unbiased estimator of θ , then T^2 is a biased estimator of θ^2 but if T is a consistent estimator of θ , then T^2 is also a consistent estimator of θ^2.

23. (1) State Cramer – Rao inequality
(2) What is the method of minimum variance?
(3) Examine whether there exists a minimum variance estimator for the parameter λ of Poisson distribution.

24. (1) Explain the procedure for testing the equality of proportion in two populations.
(2) A test of 100 youths and 200 adults showed that 42 of the youths and 50 of the adults were poor drivers. Use the data to test the claim that youth percentage of poor drivers is larger than that of adult percentage.

25. (1) Explain paired t- test
(2) A group of 12 rats were given a high protein diet and the gain in weight is observed as 13, 14, 10, 11, 12, 16, 10, 8, 11, 12, 9, 12 . Another set of 7 rats were given low protein diet and the gain In weight is observed as 7, 11, 10, 8, 10, 13, 9. Examine whether high protein diet is superior to the low protein diet at 5% level of significance.

(2×15=30)