24026989

QP CODE: 24026989

Reg No : .....

Name : .....

B.Sc DEGREE (CBCS) REGULAR / IMPROVEMENT / REAPPEARANCE EXAMINATIONS, OCTOBER 2024

Third Semester

B.Sc Mathematics Model II Computer Science

COMPLEMENTARY COURSE - ST3CMT63 - STATISTICS - STATISTICAL INFERENCE

2017 Admission Onwards

19914A96

Time: 3 Hours Max. Marks : 80

Part A

*Answer any **ten** questions.*

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

1. A random variable has mean=3 and S.D=2. Find an upper bound to P{$|X-3|>4$}.
2. Distinguish between parameter and statistic.
3. Define F statistic.
4. A random sample of size 12 is taken from a normal population with mean μ and variance 9. Find the probability that the sample variance lies between 3.4 and 14.8.
5. Define point estimation.
6. Define consistency.
7. Define sufficiency.
8. What is meant by a likelihood function?
9. Define statistical hypothesis.
10. Define null and alternative hypothesis.
11. Define size of a statistical test.
12. Write down the test statistic for testing the hypothesis that a proportion has a specified value.

(10×2=20)

Part B

*Answer any **six** questions.*

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

13. Advantages of Tchebycheff's inequality.

14. Find the mean and variance of chi-square distribution.

15. A random sample of size 10 taken from a normal population N(μ,σ) has S.D 4. Find a and b such that P($a \leq \sigma^2 \leq b$)=0.95.

16. Show that 2 $\bar{y}$ is an unbiased estimate of θ for f (y,θ) = 1/θ, $0 \leq y \leq \theta$

17. x_1,x_2,x_3 is a random sample from a normal population N(μ,σ) . $t_1=x_1+x_2-x_3$ and $t_2=2\ x_1+3\ x_2-4\ x_3$. compare the efficiencies of t_1 and t_2

18. Define sufficiency and state the Neyman's condition for sufficiency.

19. A sample of 400 men from South India has a mean height of 65.85 inches and a standard deviation of 2.50 inches while a sample of 100 men from North India has a mean height of 66.20 inches with a standard deviation of 2.52 inches. Do the data indicate that North Indians are on the average taller than the South Indians?

20. Explain the terms simple and composite hypothesis, power of a test in tests of hypotheses. What is the use of Neyman- Pearson lemma in testing of hypothesis?

21. Explain the two kinds of errors in testing a statistical hypothesis. What do you meant by critical region in testing of hypothesis?

(6×5=30)

Part C

*Answer any **two** questions.*

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

22. State Lindberg-Levy form of central limit theorem, what are its assumptions?. An unbiased die is thrown 100 times. Find by using CLT the probability that the mean of the numbers thrown will be less than 3.8

23. Derive the sampling distribution of mean and variance if samples are taken from N(μ,σ). Also show that mean and variance are independent.

24. Define interval estimation The diameters of 200 ball bearings made by a machine during a week were found to have a mean 0.824 and standard deviation 0.042. Find 1) 90% 2) 95% 3) 99% confidence intervals for the mean diameter of the ball bearings.

25. Explain the steps in a statistical test procedure. Define two types of errors involved in Testing of hypothesis.

The continuous random variable X has the frequency function

$$f(x,\theta) = 1/\theta,\ 0 \le x \le \theta$$

$$= 0\ ,\quad \text{otherwise}$$

It is desired to test the hypothesis H_0: $\theta=1$ against H_1: $\theta=2$ using a single observation X. $X \ge 0.95$ is used as the critical region. Evaluate Probability of Type I and Type II errors and power of the test.

(2×15=30)