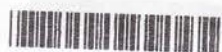


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M 9982



Reg. No. :

Name :



IV Semester B.A./B.Sc./B.Com./B.B.A./B.B.A.T.T.M./B.B.M./B.C.A./B.S.W.
(CCSS-Regular) Degree Examination, March 2011
STATISTICS (Complementary Course)
(For Maths/Comp.Science)
4C04STA : Statistical Inference

Time : 3 Hours

Total Weightage : 30

Instruction : Use of Scientific calculator permitted. Statistical tables are permitted.

PART - A

Answer any 10 questions :

(Weightage 1 each)

1. Define sampling distribution and standard error.
2. A sample of size 16 is taken from a normal population with mean 2 and standard deviation 3. What is the probability that the sample mean exceeds 2.5 ?
3. Find the mean of chi-square distribution.
4. Write down the probability density function of F-distribution.
5. Define student's t-statistic. Write down its density function.
6. Define consistent estimator.
7. Define relative efficiency of an estimator.
8. Define maximum likelihood estimator.
9. What is confidence interval for a parameter ?
10. Distinguish between simple and composite hypothesis.
11. Distinguish between parametric and non-parametric tests.

P.T.O.



PART - B

Answer any 6 questions :

(Weighthage 2 each)

12. Find the mean and variance of student's t-distribution.
13. State and prove the additive property of chi-square random variables.
14. If S^2 is the variance of a sample of size n selected from a normal population with variance σ^2 , show that S^2 is consistent for σ^2 .
15. Compare the efficiencies of the estimators

$$T_1 = \frac{x_1 + x_2 + x_3}{3}, T_2 = \frac{x_1 + 2x_2 + 3x_3}{6}, T_3 = \frac{2x_1 - x_2 + x_3}{2} \text{ for estimating the mean } \mu \text{ of the population with finite variance } \sigma^2.$$

16. Derive a 100 (1 - 2)% confidence interval for the variance of a normal population when the population mean is (i) unknown (ii) known
17. If X_1, X_2, \dots, X_n is a sample of size N from a binomial population with parameters n and p . Find the MLE of P . Assume that n is known.
18. To test $H_0: \theta = 1$ against $H_1: \theta = 2$, a sample of size 1 is taken from a population

$$\text{with density function } f(x) = \begin{cases} 1/\theta; & \text{if } 0 < x < \theta \\ 0 & \text{otherwise} \end{cases}$$

Find the level of significance and power of the test if H_0 is rejected when the observed value is greater than 0.5.

19. Obtain the most powerful size α test for $H_0: \theta = \theta_0$ against $H_1: \theta = \theta_1$ ($\theta_1 > \theta_0$) where θ is the parameter of a population

$$f(x) = \begin{cases} \theta x^{\theta-1}; & 0 < x < 1, \theta > 0 \\ 0 & \text{otherwise} \end{cases}$$

based on a sample of size n .

20. Discuss the important steps in a large sample test based on normal distribution.



PART - C

Answer any 2 questions :

(Weightage 4 each)

21. Let $X_1 X_2 \dots X_n$ be a sample of size n from a normal population with mean μ and variance σ^2 . Obtain the MLEs of μ and σ^2 .

22. To test $H_0 : P = 1/2$ against $H_1 : P = 3/4$, where p is the probability of getting head in single toss of a coin, the coin is tossed 8 times. If the number of heads obtained is 6 or more or 2 or less H_0 is rejected and H_0 is accepted otherwise. Find the probabilities of type 1 and type II errors.

23. Two random samples drawn from two normal populations are given as follows :

Sample I : 20 16 26 27 23 22 18 24 25 19

Sample II : 27 33 42 35 32 34 38 28 41 43 30 37

Test whether the two populations have the same variance (Choose 5% level of significance).

24. Explain the chi-square test of independence of attributes. Hence derive the expression for chi-square for a 2×2 contingency table.
