Reg. No. : ....

Name : ....

M 9982

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'st-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 : **(Weigthage 2 each)**

12. Find the mean and variance of student'st-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

$$T_1 = \frac{x_1 + x_2 + x_3}{3},\ T_2 = \frac{x_1, 2x_2 + 3x_3}{6},\ T_3 = \frac{2x_1 - x_2 + x_3}{2}$$ for estimating the mean μ of the population with finite variance σ^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 $X_1, X_2 .....X_n$ 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 list $H_0 : \theta = 1$ against $H_1 : \theta = 2$, a sample of size 1 is taken from a population 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 subjected when the abserved 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 importance 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 ....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 $H_0 : P = ½$ against $H_1 : P = ¾$, 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 11 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.