Reg. No................................

THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2011

(C.C.S.S.)

Statistics—Complementary

ST 3C 03—STATISTICAL INFERENCE

(2009 admissions)

Time : Three Hours | Maximum Weightage : 30

Part A

Answer · **ll** *questions.*
Each question · *¼ weightage.*

1. The moment generating function of the Chi-square distribution with n.d.f. is :

   (a) $(1-2t)^{n/-}$.

   (c) $(1-2t)^{n/-}$. (d) None of these.

2. The relation between student's t-distribution and F-distribution is :

   (a) $F_{1,1} = t_n^2$. (b) $F_{n,i} = t_f$.

   (c) $F_{1,1} = t_f$° (d) None of the above.

3. The S.D. of the sampling distribution of a statistic is known as :

   (a) Sampling error. (b) Standard error.

   (c) Means square error. (d) None of these.

4. Critical region is a region of

   (a) Rejection.

   (b) Acceptance.

   (c) Indecision.

5. By the method of moments one can estimate

   (a) All parameters of a population.

   (b) Only mean and variance of a distribution.

   (c) All moments of a population distribution.

6. If t_1 and t_2 are two estimators such that Var (t_1) < Var (t_2) then

   (a) t_1 and t_2 equally efficient. (b) t_1 is more efficient than t_2.

   (c) t_2 is more efficient than t_1. (d) None of these.

Turn over

7. The probability of type II error is ·

(a) Power. (b) 1-power.

(c) Size. (d) None of these.

Let $X_1, X_2, \ldots, X_n$ is a random sample from a normal population with mean μ and variance σˆ and then the distribution of $\frac{ns^{\hat{}}}{{}_2}$ follows Chi-square with n-1 degrees of freedom if :

(a) $S^2 = \frac{}{n-1} \sum_{i=\hat{}} (X_\cdot$ (b) $s^2 \quad 2 \sum_{i=z}^{n} (X_i \quad 2$

(c) $S2 = \frac{2}{n} \sum_{i=}^{I}$ (d) None of these.

9. Which of the following statement is true ?

(a) MLE is unbiased. (b) MLE is consistent.

(c) MLE is unique. (d) None of these.

10. Level of significance is the probability of :

(a) Type I error.

(b) Type 11 error.

(c) Not committing error.

11. Testing $H_o : \mu = 10$ Vs. $H_1 : \mu = 10$ leads to :

(a) One-sided upper tailed test.

(b) One-sided lower tailed test.

(c) Two-tailed test.

12. Distribution of the test statistic used to test $H_0 \quad \sigma^{\hat{}} = \sigma_0^2$, where a^2 is the variance of a normal population w·th unknown mean :

(a) Chi-square distribution with n 1 degrees of freedom.

(b) Chi-square distribution with n degrees of freedom.

(c) *t* distribution with n – 1 degrees of freedom.

(d) *t* distribution with n degrees of freedom.

(12 x ¼ = 3 weightage)

Part B

Answer **all** *nine questions.*
Each question carries 1 weightage.

13. What are the uses of Chi-square distribution ?

14. What do you mean by sampling distribution ?

15. Define an unbiased estimator ?

16. What do you mean by confidence interval ?

17. What are the desirable properties of a good estimate ?

18. Define most powerful critical region.

19. State Fisher Neyman factorization criterion.

20. Write down the application of Neyman Pearson Lemma.

21. Distinguish between Type I and Type II errors.

x 1 = 9 weightage)

Part C

Answer **any five** *questions.*
Each question carries 2 *weightage.*

22. State the relation between the normal x^2, t and F distribution.

23. Let $X_1, X_2, \ldots, X_n$ is a random sample from a normal population with mean μ and variance a^2 Obtain a sufficient statistic for a a when μ is unknown.

24. Obtain a 95 % confidence limits for the meanμ of a normal population N (μ, a^2) when a is unknown.

25. Give an example of a MLE which is consistent but not unbiased.

26. Distinguish between Simple and Composite hypotheses ? Give examples.

27. Obtain the moment estimator for 0 in the population with density given by

$$f(x, \theta) = \frac{1}{\theta} e^{\theta} \quad x \geq 0 \quad O > 0.$$

28. Explain the test procedure to test the hypothesis that H_o $a^2 = \sigma_0^2$ against the alternative $H_1 : a^2 > \sigma_0^2$, where a is the variance of a normal population with unknown mean.

(5 X 2 = 10 weightage)

Part D

Answer any two questions.
Each question carries 4 *weightage.*

29. State and prove additive property of Chi-square distribution.

30. Let $X_1, X_2, \ldots, X_n$ is a random sample from a population with density

$$f(x, f3) - \frac{e^{-\beta x} x^{\alpha - 1} \beta}{\Gamma(\alpha)} \quad 0 < x < co,$$

Find the mole of when a is known. Also find the variance of the mle.

31. Explain the test procedure to test the equality of means of two normal populations with unknown but equal variances.

(2 x 4 = 8 weightage)