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# THIRD SEMESTER B.Sc. DEGREE EXAMINATION, NOVEMBER 2013

(UG–CCSS)

Complementary Course—Statistics

## ST 3C 03—STATISTICAL INFERENCE

Time : Three Hours | Maximum : 30 Weightage

### Part A

*Answer* **all** *questions.*
*Each question carries* $^1/_4$ ***weightage.***

1. The mean of the Chi-square distribution with n d.f. is :

   (a) n. (b) 2n.

   (c) $n-2$. (d) None of these.

X follows N (0, 1) and Y follows a Chi-square with n degrees of freedom then $\frac{X}{\sqrt{y}}$ *is* distributed as

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

   (b) t-distribution with n-1 degrees of freedom.

   (c) t-distribution with n degrees of freedom.

   (d) Chi-square with n degrees of freedom.

3. Standard deviation of the sampling distribution of an estimator is called :

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

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

4 f $t_n$ is consistent estimator of 0 then as n $\to \infty$ :

   (c) Var $\to \infty$. (d) Var ($t_n$ 0.

5. If $X_1, X_2,$ $X_n$ is a random sample from a population $p^x$ *(1 p)* for x = 0, 1 and 0 < $p$ < *1,* the sufficient statistics for $p$ *is*

   (a) Xi . (b) 117 $_1$ Xi .

   (c) Both (a) and (b). (d) None of these.

6. Fisher Neyman factorization criterion is used to obtain an estimator which is :

   (a) Consistent. (b) Unbiased.

   (c) Efficient. (d) Sufficient.

Turn over

g test is a test for goodness of fit :

(b) F-test.

*e* test. (d) All of the above.

ıence co-efficient (1-a), the most preferred confidence interval for the parameter

shortest width. (b) With largest width.

(c) ı an average width. (d) None of these.

9. A hypothesis which completely specified the form of the distribution of the population is called :

(a) Simple. (b) Composite.

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

10. Level of significance is the probability of

(a) Type I error. (b) Type II error.

(c) No error. (d) None of these.

11. Distribution of the test statistic used to test $H_o: \sigma = \sigma_0^2$, where $a^2$ is the variance of a normal population with known 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. The value of Chi-square statistic is zero if and only if :

(a) $\sum_i O_i = \sum_i E_i$.

(b) $O_i = E_i$ for all $i$.

(c) $E_i$ is large.

(12 x $^1/_4$ = 3 weightage)

## Part B

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

13. Define a t-statistics.

14. If $X_1, X_2, \ldots, X_n$ is a random sample from a normal population with mean $\mu$ and variance $a^2$, obtain the distribution of $\frac{1}{n}$ $X_i$.

15. Distinguish between point estimation and interval estimation.

16. Define consistency of estimators.

17. Define the concept of efficiency.

18. If $X_1, \ldots, X_n$ is a random sample from a uniform distribution over (0, 0), obtain the moment estimator for 0.

19. **Define type I and type II error.**

20. **Define power of a test.**

21. **Write down the test statistic used to test the equality of means of two normal populations, when the variances are known.**

(9 x 1= 9 weightage)

## Part C

*Answer any* **five** *questions.*

*Each question carries* 2 *weightage.*

22. **State the relation between the normal, Chi-square, *t* and F distributions.**

23. **State Fisher Neyman factorization criterion.**

24. **Describe maximum likelihood method of estimation.**

25. **Obtain a sufficient estimator for 0 using a sample of size n from** $f\,,O) = \frac{1}{\sqrt{2\pi\theta}} \cdot e^{-x\,/2\theta}$

26. **Obtain a 95 % confidence interval for the mean of a normal population when S.D. is known.**

27. **State Neyman-Pearson Lemma.**

28. **Describe paired sample t-test.**

(5 x 2 = 10 weightage)

## Part D

*Answer any* **two** *questions.*

*Each question carries* 4 *weightage.*

29. **If $X_1, X_2, \ldots, X_n$ is a random sample from a normal population with mean $\mu$ and variance $a^2$, obtain the distribution of sample mean and variance.**

30. **Let $X_1, X_2, \ldots, X_n$ is a random sample from a normal population with mean $\mu$ and variance $a^2$, obtain the MLE's of $\mu$ and $a^2$.**

31. **Explain the test procedure for test the equality of variances of two normal populations with known means.**

(2 x 4 = 8 weightage)