C 83770 (Pages : 3) Name.....

Reg. No.....

# SECOND SEMESTER M.A. DEGREE EXAMINATION, JUNE 2015

(CUCSS)

Economics

ECO 2C 07—QUANTITATIVE TECHNIQUES – II

Time : Three Hours Maximum : 36 Weightage

## Part A

*Answer* **all** *the questions.*

*Each bunch of four questions carries a Weightage of* 1.

(A) Multiple Choice Questions :

1. Binomial distribution with parameter $p$ is symmetric when :

   (a) $p < \frac{1}{2}$. (b) $p > \frac{1}{2}$.

   (c) $p = \frac{1}{2}$. (d) $p \geq \frac{1}{2}$.

2. Fifth central moment of normal distribution is :

   (a) One. (b) Zero.

   (c) $5\sigma^2$. (d) $\mu^5 + 3\sigma^2$.

3. The Chi-square distribution was first discovered by :

   (a) Helmert. (b) Fisher.

   (c) Neyman. (d) Gauss.

4. Bias of an estimator can be :

   (a) Positive. (b) Negative.

   (c) Either positive or negative. (d) Always zero.

(B) Multiple Choice Questions :

5. The mathematical expectation of a random variable exists if :

   (a) $E(X) < \infty$. (b) $|E(X)| < \infty$.

   (c) $E|X| < \infty$. (d) $E(X) > 0$.

Turn over

6. The area under standard normal curve beyond the lines $z = \pm 1.96$ is :

(a) 95%. (b) 99%.

(c) 1%. (d) 5%.

7. The mode of F-distribution is always :

(a) Less than unity. (b) Greater than unity.

(c) Equal to unity. (d) An integer.

8. Power of a test is related to :

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

(c) Both type I and type II errors. (d) Neither type I nor type II error.

(C) Fill in the blanks :

9. If F is distribution function of a random variable X, then $\lim_{x \to \infty} F(x) =$ ———.

10. If X is a standard normal variate, then the distribution of $Y = e^{-X}$ is ———.

11. Variance of $t$-distribution with $n$ degrees of freedom exists only when ———.

12. Critical region is also known as ———.

(D) State whether the following statements are True *or* False :

13. In case of point-binomial distribution, mean is always greater than variance.

14. The normal distribution is multimodal.

15. The Chi-square distribution curve is leptokurtic.

16. Maximum likelihood estimators are unbiased.

(4 × 1 = 4 weigh

## Part B

*Answer any* **ten** *questions.*
*Each question carries a Weightage of* 2.

17. Define cumulative distribution function. State its properties.

18. A box contains 6 white and 9 black balls. Five balls are drawn at random. Find the expected of the number of white balls drawn.

19. Define binomial distribution and state its important characteristics.

20. Define the standard normal distribution and state its properties.

21. Distinguish between parameter and statistic.

22. Obtain the sampling distribution of sample mean.

23. Explain the reproductive property of Chi-square distribution.

24. Establish a relationship between Chi-square and F distributions.

25. Distinguish between null and alternative hypothesis.

26. Explain the term "level of significance", with an example.

27. Describe the difference between small sample and large sample tests.

28. Explain the concept of "efficiency", with suitable examples.

29. Obtain $100(1-\alpha)\%$ of confidence interval for the proportion of binomial population.

30. Explain Neyman-Pearson Lemma.

(10 × 2 = 20 weightage)

## Part C

*Answer any* **three** *questions.*
*Each question carries a Weightage of* 4.

31. Describe Poisson distribution. In a certain factory, it is found that one in 200 articles produced is defective. If the articles are packed 100 in each packet, out of 200 packets, determine :

    (a) How many are likely to be free from defects ?

    (b) How many will contain one or more defective products ?

32. The mean of the inner diameters (in inches) of a sample of 200 tubes by a machine is 0.502 and the standard deviation is 0.005. The purpose for which these tubes are intended allows a maximum tolerance in the diameter of 0.496 to 0.508. What percentage of the tubes produced by the machine is defective if the diameter are found to be normally distributed.

33. (a) State important properties of maximum likelihood estimators.

    (b) Find the maximum likelihood estimator of the mean and variance of the normal population.

34. Discuss the application of Chi-square $t$ and F distributions.

35. If $X \geq 1$ is the critical region for testing $H_0 : \theta = 2$ *vs.* $H_1 : \theta = 1$ on the basis of a single observations from the population with p.d.f. $f(x) = \theta e^{-\theta x}, x > 0, \theta > 0$. Obtain the size and power of the test.

(3 × 4 = 12 weightage)