C 63125 **(Pages : 4)** **Name**

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

SECOND SEMESTER M.A. DEGREE EXAMINATION, JUNE 2019

(CUCSS)

Economics

EC 02 C08—QUANTITATIVE METHODS FOR ECONOMIC ANALYSIS—II

(2015 Admissions)

Time • Three Hours Maximum : 36 Weightage

Part A (Multiple Choice)

Answer **all** *questions.*
Each question carries a weightage of %.

1. For a discrete random variable X with distribution function F(x),P(a < X b) is ————————

   (a) F(b) - F(a) + P(X = *b).* (b) F(b) - F(a) - P(X = *b).*

   (c) F(b) F(a) - P(X = *a).* (d) F(b) - F(a).

2. Mean of X following binomial distribution with parameters 8 and 0.5 is ————————

   (a) 16. (b) 8.

   (c) 4. (d) None of these.

3. Variance of X following Poisson distribution is 2. P (X > 0) = ————

   (a) e^{-2}. (b) $1 - e^{2}$.

   (c) $\cdot^{I}$. (d)

4. For a continuous random variable X with p.d.f. *f (x),* P(a < X < *b)* is same to ————

   (a) P(a<X_b). (b) P (a X s *b),*

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

5. For X following normal distribution with mean 5 and variance 2, P (X > 5) = ————

   (a) 0.5. (b) 1.

   (c) O. (d) 0.25.

6. X is a N (0, 1) random variable with P (X < - a) = 0.2. Then P (- a < X < a) is ————

   (a) 0.2. (b) 0.8.

   (c) 0.6. (d) 0.4.

7. 25 random samples are taken from normal distribution with mean 15 and SD 3, denoted by N (15, 3). Then the mean of the sample follows ————

   (a) N(15, 3/25). (b) N(10, 3/25).

   (c) N(15, 3/5). (d) N(10, $^{3}/_{5}$).

Turn over

8. Probability distribution of the square of a standard normal random variable is

   (a) Normal. (b) Chi-square.

   (c) *t*. (d) F.

9. Range of variation of a random variable following F distribution is

   (a) 0 to 1. (b) 0 to cc.

   (c) — to 0D. (d) None of these.

10. Which of the folldwing properties are satisfied by the mean of the sample as an estimator to the parameter 2 involved in a Poisson distribution ?

    (a) Consistency. (b) Unbiasedness.

    (c) Both. (d) None.

11. Power of a test is

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

    (c) 1— P (Type I error). (d) 1 — P (Type II error).

12. Statistic following distribution is used in small sample test to test the mean of a normal population when population variance is not known.

    (a) Normal. (b) Chi-square.

    (c) *t*. (d) F.

(12 x = 3 weightage)

Part B (Very Short Answers)

Answer any five *questions.*
Each question carries 1 weightage.

13. Define Bernoulli trial.

14. If mean and variance of a binomial distribution with parameters n and *p* are respectively 2 and 1.2, identify the values of n and *p.*

15. If .X follow Poisson distribution with parameter 4, find V (3X — 4).

16. State any two properties of normal distribution.

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

18. Define type I and type II errors.

19. State Neymaan-Pearson Lemma.

20. Write down the test statistic used in testing of the proportion of success of a population.

(5 x 1 LT 5 weightage)

Part C (Short Answers)

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

21. State and prove the multiplication theorem on Mathematical expectation for two random variables X and Y.

22. When an unbiased die is tossed, the occurrence of the sides 4 or 6 is considered as a success. If X denote total number of successes out of the six tosses, find (i) $P(X = 0)$; (ii) $P(X > 5)$.

23. Obtain the expectation of a Poisson random variable X with parameter

24. If X follows $N(15, 5)$, find (i) $P(X > 20)$; (ii) $P(X < 5)$.

25. A sample of size 36 was taken from a normal population with mean 14 and S.D. 6. Find the probability that the sample mean to differ from the population mean by more than 2.

26. Obtain the variance of a Chi-square random variable X with n degrees of freedom.

-27. Differentiate between point and interval estimation.

28. What is statistical hypothesis ? Define (i) level of significance ; (ii) power of a test.

29: A sample of 900 screws has mean weight 4.45 g. Can we consider it as a sample taken from the box of screws with mean weight 5 g. and with the variance 4 at a 5 % level of significance ?

30. Explain paired t-test.

31. Write a short note on. ANOVA.

(8 $^{\times}$ 2 = 16 weightage)

Part D (Essays)

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

32. Fit a Poisson distribution to the following data and identify the theoretical frequencies :

x	0.	1	2	3	4	5	6	7	8
y :	56	156	132	92	37	22	4	0	1

33. The steal nails packed to distribute to local stores by a certain company have an average length of 5 centimeters and a standard deviation of 0.05 centimeters. Assuming that the lengths are normally distributed, what percentage of the nails are :

    (a) Longer than 5.05 centimeters.

    (b) Between 4.95 and 5.05 centimeters in length.

    (c) Shorter than 4.90 centimeters.

34. As a part of the research on nutrition, a group of researchers applied a particular protein diet for a large group of mice. They claim that the diet results in increases of the gain in weight. Assuming that it is known from previous studies that cI = 4.5 grams, how many mice should be included in our sample if we wish to be 95% confident that the mean weight of the sample will be within 3 grams of the population mean for all mice subjected to this protein diet.

35. From two different normal populations, samples of sizes $n_1 = 26$ and $n_2 = 38$ are taken independently. The mean of 26 samples taken from first population is noted as xl ,a 78 and the mean of 38 samples taken from second population is recorded as $x_2 = 74$. The population standard deviations of the two normal populations are $a_1 = 4.9$ and $cT_2 = 3.2$ respectively. Test the hypothesis that kry = against the alternative v_i # $p_{.2}$.

Turn over

36. Explain Chi-square test of independence. Using following data on 100 students test whether gender and ability in Mathematics are associated :

Ability in Maths -->	Poor	Average	Excellent
Boys	10	15	25
Girls	25	10	15

(3 x 4 = 12 weightage)