SECOND SEMESTER M.A. DEGREE EXAMINATION, JUNE 2019

(CUCSS)

Economics

EC 02 C08—QUANTITATIVE METHODS FOR ECONOMIC ANALYSIS—II

(2015 Admissions)

: Three Hours | Maximum : 36 Weigh

Part A (Multiple Choice)

Answer **all** *questions.*
Each question carries a weightage of ¼.

1. For a discrete random variable X with distribution function $F(x)$, $P(a < X \leq b)$ 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) $e^{-\sqrt{2}}$.
   - (d) $1 - e^{-\sqrt{2}}$.
4. For a continuous random variable X with p.d.f. $f(x)$, $P(a < X < b)$ is same to ———.
   - (a) $P(a < X \leq b)$.
   - (b) $P(a \leq X \leq b)$.
   - (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) 0.
   - (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, d 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).

T

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 ∞.
   (c) $-\infty$ to ∞.
   (d) None of these.

10. Which of the following properties are satisfied by the mean of the sample as an est... parameter λ 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 ... population when population variance is not known.

    (a) Normal.
    (b) Chi-square.
    (c) t.
    (d) F.

(12 × ¼ = 3)

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 respec... 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 populati...

(5 × 1 = 5)

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 rand... 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 λ.

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 × 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 σ = 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 $\bar{x}_1 = 78$ and the mean of 38 samples taken from second population is recorded as $\bar{x}_2 = 74$. The population standard deviations of the two normal populations are $\sigma_1 = 4.9$ and $\sigma_2 = 3.2$ respectively. Test the hypothesis that $\mu_1 = \mu_2$ against the alternative $\mu_1 \neq \mu_2$.

Turn over

36. Explain Chi-square test of independence. Using following data on 100 students [illegible] and ability in Mathematics are associated : 9

Ability in Maths →	Poor	Average	Excellent
Boys	10	15	25
Girls	25	10	15

(3 × 4 = [illegible]