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Name.....

Reg. No.....

SECOND SEMESTER M.A. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, APRIL 2023

(CBCSS)

Econometrics

ECM 2C 08—PROBABILITY AND PROBABILITY DISTRIBUTIONS

(2020 Admission onwards)

Time : Three Hours

Maximum : 30 Weightage

Part A (Multiple Choice Questions)

Answer **all** *questions.*
Each question carries 1/5 *weightage.*

1. For very small numbers of degrees of freedom, the chi-square distribution is :

   a) Skewed towards right.
   b) Skewed towards left.
   c) Symmetrical.
   d) Unpredictable.

2. Choose the correct answerc :

   Statement 1 : The total area under the curve for F distribution is one.

   Statement 2 : F distribution is symmetrical.

   a) Only statement 1 is correct.
   b) Only statement 2 is correct.
   c) Neither statement 1 nor statement 2 is correct.
   d) Both the statements are correct.

3. *t* distribution tends to be a normal distribution as :

   a) Degrees of freedom increases.
   b) Degrees of freedom decreases.
   c) Either a) or b).
   d) None of these.

Turn over

4. As the standard error decreases, the sample means will cluster very close to ———————.

a) Population Mean. b) Population Median.

c) Either a) or b). d) None of these.

5. The standard deviation of a sampling distribution is called :

a) Variance. b) Statistic.

c) Standard error. d) None of these.

6. The parameter/parameters of normal curve is/are ———————.

a) μ. b) 6.

c) Either a) or b). d) Both a) and b).

7. The Binomial distribution arises when a Bernoulli experiment is repeated ——————— times.

a) Two. b) n.

c) Neither a) or b). d) Either a) or b).

8. ——————— Distribution describes the arrivals of independent events per unit of time or space.

a) Poisson. b) Binomial.

c) Lognormal. d) Exponential.

9. An exponential distribution always ———————.

a) Platykurtic. b) Bell shaped.

c) Skewed towards left. d) Skewed towards right.

10. Find the probability of getting a total of 7 or 11 in a single throw with two dice :

a) 1/8. b) 1/16.

c) 2/9. d) None of these.

11. Waiting time for a rare event is :

a) Uniformly distributed. b) Exponential distributed.

c) Normally distributed. d) None of these.

12. A numerical measure of a population is called :

a) Parameter. b) Mean.

c) Statistic. d) None of these.

13. The mean of the probability distribution of a random variable is called _____.

a) Probability distribution function.

b) Expected value.

c) Sampling distribution.

d) None of these.

14. The distribution useful in testing the equality of two population variances :

a) F. b) *t*.

c) *z*. d) None of these.

15. A random variable is a function of _____.

a) Event. b) Statistic.

c) Sample space. d) None of these

(15 × 1/5 = 3 weightage)

Part B (Very Short Answer Questions)

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

16. Find the mathematical expectation of receiving a tail when a balanced coin is tossed twice.

17. Define Random variable ?

18. If A and B are independent events and $P(A) = 1/3$ and $P(B) = 3/4$. Find $P(A \cup B)$.

19. Write a note on Baye's theorem ?

20. Let the probability of an item, to be defective, produced by a factory be 0.10.A sample of 10 items has been inspected, what is the probability of an event E that has the sample of two defective item.

21. Distinguish between Discrete and Continuous random variables.

Turn over

22. The following table gives the number of births according to their sex and condition at the time of birth. Test at $\alpha = 0.05$ whether the condition at birth depends at the sex of the child :

SEX	Normal	Abnormal
Male	19	5
Female	30	6

23. Explain Exponential Distribution ?

(5 × 1 = 5 weightage)

Part C (Short Answer Questions)

Answer any **seven** *questions.*
Each question carries weightage of 2.

24. In a sample of 8 observations, the sum of the squared deviations from their mean was 94.5. In another sample of 10 observations, the value was found to be 101.7. Test whether the difference is significant at 5 % level.

25. In what situation do the following distribution tend to normal distribution : (a) t distribution ; and (b) Chi-square distribution

26. Define Poisson distribution. Explain its properties ?

27. The marks of 10th standard students in a school is normally distributed with mean 54 and standard deviation 12. What proportion of students has marks between 46 and 56 ?

28. Distinguish between Characteristic function and Moment generating function.

29. What do you meant by expected value of X ? Write down the properties of expectation.

30. basket contains 20 bad oranges and 80 good oranges. Three oranges are drawn at random from this basket. Find the probability that of three (i) at least 2 ; (ii) exactly 2 ; and (iii) utmost 2 are good oranges

31. Write a note on Addition and Multiplication theorem of probability

32. Explain Bernoulli's theorem.

33. It is said that some relationship exists between t, chi square and F, if so, prove the same.

(7 × 2 = 14 weightage)

Part D (Essay Questions)

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

34. The following table gives the 10 most recent estimates of two contractors A and B for clean up and repair of structural damage. Test whether at 5 % level of significance, is there difference between estimates of the two contractors :

Contractor A	:	5500	1000	2500	7800	6400	8800	600	3300	4500	6500
Contractor B	:	6000	900	2500	8300	6200	9400	500	3500	5200	6800

35. The table below shows the number of days in a 50 day period which automobile accidents occurred in a certain part of a city. Fit a Poisson distribution to the data :

Number of accidents	:	0	1	2	3	4	Total
Number of days	:	19	18	8	4	1	50

36. (a) Distinguish clearly the difference between the following concepts :

(i) Mathematical and statistical probability ; and

(ii) Mutually Exclusive and independent events.

(b) The probability that a man will be alive for 25 years is 3/5 and the probability that his wife will be alive for 25 years is 2/3. Find the probability that (i) both will be alive ; (ii) only the man will be alive ; (iii) only the wife will be alive ; and (iv) at least one will be alive.

37. Briefly discuss the different sampling distributions ?

(2 × 4 = 8 weightage)