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Reg. No. : ....

Name : ....

Third Semester B.Sc. Degree Examination, March 2021.

First Degree Programme under CBCSS

Statistics

Complementary Course for Mathematics

ST 1331.1 – STATISTICAL DISTRIBUTIONS

(2019 Admission Regular)

Time : 3 Hours Max. Marks : 80

SECTION – A

Answer **all** questions. Each question carries **1** mark :

1. What is the mean and variance of a Binomial random variable with n=10 and $p = 0.2$.

2. What is characteristic function. Write down the characteristic function of a Poisson distribution.

3. Write down the pmf of Geometric distribution.

4. Which continuous distribution has lack of memory property?

5. What is the use of MGF?

6. Give the mean and variance of Gamma distribution.

7. State WLLN.

P.T.O.

8. What is the limiting distribution in Central limit theorem?

9. Define raw moment.

10. Characteristic function always exist. True or False?

($10 \times 1 = 10$ Marks)

SECTION – B

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

11. Define Hypergeometric distribution.

12. Obtain the mean and variance of Exponential distribution?

13. If $X \sim N(0,1)$, what is P(X<1.96)?

14. What is the cdf of a Exponential distributions?

15. Prove the additive property of Binomial distributions.

16. Obtain the expression for central moment in terms of raw moments.

17. State and prove Bernoulli Law of Large numbers.

18. Show that for iid random variables, sample mean converges in probability to population mean.

19. What is Chebyshev's inequality?

20. If X is a Normal random variable with mean 2 and variance 2. Find $P(|X_n - 2| > \sqrt{2}1.96)$.

21. What is the pdf of Standard Normal distribution. Give mean and variance.

22. If X is a random variable with distribution function F(x), what are the properties of F(x).

23. Obtain the moment generating function of Exponential distribution.

24. What are the first and second raw moment of Hyper-geometric distribution?

25. Show that sum of Exponential distribution follows Gamma distribution.

26. X follows N(0,I), Find the distribution of $Y = \frac{x-5}{2}$.

(8 × 2 = 16 Marks)

SECTION – C

Answer **any six** questions. Each question carries **4** marks.

27. Derive variance of Normal distribution.

28. Find mean and variance of Poisson distribution using MGF

29. Derive the distribution of sum of two Normal distribution.

30. Find the mode of the Normal distribution.

31. Explain the fitting of Binomial distributions.

32. Find the coefficient of variation of a Exponential distribution.

33. If X is a continuous random variable with pdf $f(x) = \begin{cases} 3e^{-3x}, x > 0 \\ 0, \quad elsewhere \end{cases}$, then $P(X < 3) =$ ____________

34. If X ~ Poisson(6), then find the distribution of $X + a$

35. State and prove memory less property of Exponential distribution.

36. Obtain the Poisson distribution as a limiting form of Binomial distribution.

37. Find the mean and variance of Beta distribution of first kind.

38. If $\{X_i\}$ is a sequence of i.i.d random variables with mean 0 and variance 1. Show that sample mean converges in probability to 0.

(6 × 4 = 24 Marks)

SECTION – D

Answer **any two** questions. Each question carries **15** marks

39. Fit the Poisson distribution for the following data.

X	0	1	2	3	4	5	6	7
Frequency	7	6	19	35	30	23	7	1

40. Show that Binomial distribution converges to Normal distribution.

41. (a) Prove the additive property of Gamma distribution.

    (b) Derive the first two central moments of Normal distribution using MGF.

42. (a) What is the probability of obtaining more than 1499 heads in 1500 tosses of a fair coin.

    (b) Derive the mgf of Binomial distribution and hence obtain the first three central moments.

43. (a) Show that sum and difference of two Normal random variables are Normal.

    (b) Obtain the mean and variance of Geometric distribution.

44. (a) Define Uniform distribution. Derive the mean and variance.

    (b) Derive the recurrence relation for probabilities of Binomial distribution.

(2 × 15 = 30 Marks)