Reg. No. : ....

Name : ....

Fourth Semester B.Sc. Degree Examination, August 2022

First Degree Programme under CBCSS

Statistics

Core Course

ST 1441 : PROBABILITY AND DISTRIBUTION II

(2019 Admission Onwards)

Time : 3 Hours

Max. Marks : 80

SECTION – A

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

1. Define Bernoulli distributions.

2. Find the variance of binomial distribution with $n = 10$ and $P = \frac{1}{2}$.

3. A Poisson distribution has a double mode at $X = 2$ and at $X = 3$. Find its mean.

4. Give the probability function of a multinominal distribution.

5. Give a discrete distribution which posess lack of memory property.

6. Write down the distribution function of exponential distributions with parameter θ.

7. Define standard normal variate.

8. Define beta distribution of second kind.

9. Describe lognormal distribution.

10. What is the relation between mean, median and mode of normal distribution.

<div align="right">(10 × 1 = 10 Marks)</div>

SECTION – B

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

11. Find the moment generating function of discrete uniform distribution with n points.

12. Obtain the mean of hypergeometric distribution.

13. Let $X \sim P(\lambda)$ such that $P(X = 3) = P(X = 4)$. Find $P(X = 0)$.

14. Obtain the variance of a geometric distribution.

15. Find the probability generating function of poisson distribution.

16. Discuss the additive property of Bernoulli distribution.

17. Obtain the mean and variance of a degenerate distribution.

18. Discuss the applications of life testing problems.

19. Find the recurrence relation of probabilities of Poisson distribution.

20. Find the moment generating function of uniform $(0, \theta)$ distribution.

21. Define bivariate normal distribution.

22. Describe double exponential distribution.

23. Write any two properties of normal distribution.

24. Obtain the mean of log normal distribution.

25. Define Cauchy distribution. Explain its standard form.

26. Obtain the $P(X \leq 3)$ in the case of exponential distribution with $\theta = 1$.

<div align="right">(8 × 2 = 16 Marks)</div>

SECTION – C

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

27. With usual notations show that the Poisson distribution is a limitting case of binomial distribution.

28. Obtain the first four raw moments of geometric distribution.

29. Establish the recurrence relation of central moments of binomial distribution.

30. State and prove lack of memory property of exponential distribution.

31. Obtain the moment generating function of $N(\mu, \sigma^2)$ and hence find its mean and variance.

32. Explain the properties of Cauchy distribution.

33. Find the mean and variance of beta distribution of first kind.

34. Obtain the variance-covariance matrix of bivariate normal distribution.

35. Explain the area property of normal distribution.

36. Establish the additive property of gamma distribution.

37. Obtain the mean and variance of double exponential distribution.

38. Find the mode of Poisson distribution.

<div align="right">(6 × 4 = 24 Marks)</div>

SECTION – D

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

39. (a) Obtain the first four central moments of Poisson distribution and find the skewness and kurtosis.

    (b) Obtain the mean and variance of negative binomial distribution.

40. (a) Obtain the beta and gamma coefficients of normal distribution.

    (b) Establish the additive property of binomial distribution.

41. (a) Obtain the mean, variance and covariance of multinomial distribution.

    (b) Describe hypergeometric distribution and find its variance.

42. (a) obtain the mode of binomial distribution.

    (b) Find the mean deviation about mean of normal distribution.

43. Derive the marginal and conditional distribution of bivariate normal distribution.

44. (a) Obtain the moment generating function of gamma distribution and hence find its mean and variance.

    (b) Fit a Binomial distribution for the following data and obtain the expected frequencies. Also find the mean and variance of the fitted distribution.

x	0	1	2	3	4	5	6	7
$f(x)$	7	6	19	35	30	23	7	1

    $(2 \times 15 = 30 \text{ Marks})$