S – 3409

Reg. No. : .....

Name : .....

Third Semester B.Sc. Degree Examination, February 2024

First Degree Programme under CBCSS

Statistics

Complementary Course for Mathematics

ST 1331.1 : STATISTICAL DISTRIBUTIONS

(2022 Admission)

Time : 3 Hours

Max. Marks : 80

SECTION – A

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

1. Define discrete uniform distribution.
2. What is the distribution of the sum of two independent binomial distributions?
3. Define the memoryless property of the exponential distribution.
4. Define gamma distribution.
5. Write any two properties of Normal distribution.
6. State Chebychev's inequality.
7. What is the Weak Law of Large Numbers (WLLN)?

8. What is a parameter in statistics?

9. Explain the concept of sampling distributions.

10. Write the use of *t* distribution in Statistics.

(10 × 1 = 10 Marks)

SECTION – B

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

11. State the additive property of the binomial distribution.

12. What is the moment-generating function for continuous uniform distribution over the interval [a,b].

13. Write the mode of Poisson distribution.

14. Express the probability mass function for a hypergeometric distribution.

15. What are the first two raw moments of the beta distribution (I kind)?

16. Write the Characteristic function of Normal distribution.

17. Briefly explain the Central Limit Theorem.

18. What is the key assumption for the CLT to hold?

19. Write the mean and variance of the chi-square distribution with *n* degrees of freedom.

20. Provide the definition of the F distribution.

21. How does the chi-square distribution relate to categorical data analysis?

22. Give some applications of *F* distribution.

(8 × 2 = 16 Marks)

SECTION – C

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

23. Derive the mode of binomial distribution.

24. State and prove the memoryless property of the geometric distribution.

25. Let $X \sim P(\lambda_1)$ and $Y \sim P(\lambda_2)$ and X and Y are independent. Then find the distribution of $X \mid X + Y = t$.

26. Find the mean of the hypergeometric distribution.

27. Derive the moment-generating function for the gamma distribution.

28. Derive the beta type II distribution.

29. Establish the convergence of Binomial distribution to Normal distribution.

30. Find the MGF of chi-square distribution.

31. State and prove WLLN.

(6 × 4 = 24 Marks)

SECTION – D

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

32. Fit binomial distribution for the following data

Observations (X)	0	1	2	3	4	5	6	7
Frequency (f)	20	18	16	10	11	17	19	21

33. Derive the convergence of the Poisson distribution to the Normal distribution.

34. State and prove Chebychev's inequality.

35. Derive the interrelationship between chi-square, *t* and *F* statistic.

(2 × 15 = 30 Marks)