



NP – 200

30
III Semester B.Sc. Examination, March/April 2023
(NEP) (2022 – 23 and Onwards) (Freshers)
STATISTICS

ST – 301 : Calculus and Probability Distribution

Time : 2½ Hours

Max. Marks : 60

- Instructions* : 1) Scientific calculators are **permitted**.
2) **Statistical tables** and **graph sheets** are provided on **request**.

PART – A

Answer **any four** questions (2 marks each).

(2×4=8)

1. What do you mean by continuity of a function ?
2. Define joint probability mass function.
3. Define geometric distribution.
4. Write down the definition of multinomial distribution.
5. Write down the p.d.f. of beta distribution of first kind.
6. Define standard error and mention its use.

PART – B

Answer **any four** questions. (5 marks each).

(5×4=20)

7. State and prove mean value theorem.
8. With usual notation prove that $E(X+ Y) = E(X) + E(Y)$.
9. If X and Y are independent then show that $r_{xy} = 0$ and give an example to prove the converse is not true.
10. Obtain mean of hyper geometric distribution.
11. Define exponential distribution. Obtain its m.g.f. and mean.
12. Derive the moment generating function of Chi-square distribution.

P.T.O.



PART – C

Answer any four questions (8 marks each).

(8×4=32)

13. a) Show that $f(x) = x^e$ is continuous on \mathbb{R} (real line).b) Show that the function $f(x) = \frac{1}{x}$ is continuous at 1. (4+4)

14. State and prove Chebyshev's inequality.

15. Let X_1, X_2, \dots, X_n be a sequence of independent random variables with $E(X_i) = \mu$ and $V(X_i) = \sigma^2$, $i = 1, 2, \dots, n$. Define $\bar{X}_n = \frac{1}{n} \sum_{i=1}^n X_i$, then for any $\varepsilon > 0$, $P\{|\bar{X}_n - \mu| \geq \varepsilon\} \rightarrow 0$ as $n \rightarrow \infty$.

16. Write the pmf of Negative Binomial distribution and find its mean.

17. Obtain mean and variance of gamma distribution.

18. Explain the method of generating a random sample from exponential distribution.