



23104294

QP CODE: 23104294

Reg No : .....

Name : .....

**B.Sc DEGREE (CBCS) REGULAR / IMPROVEMENT / REAPPEARANCE  
EXAMINATIONS, JANUARY 2023**

**Third Semester**

**COMPLEMENTARY COURSE - ST3CMT03 - STATISTICS - PROBABILITY  
DISTRIBUTIONS**

Common to B.Sc Physics Model I, B.Sc Mathematics Model I & B.Sc Computer Applications Model

III Triple Main

2017 Admission Onwards

9E0259AA

Time: 3 Hours

Max. Marks : 80

**Part A**

*Answer any **ten** questions.*

*Each question carries **2** marks.*

1. The probability that sets consisting of 1, 2, 3, 4 and 5 persons pay a visit to an art gallery are 0.2, 0.5, 0.2, 0.07, 0.03 respectively. What is the expected number of persons per set ?
2. Define harmonic mean and mean deviation about mean using expectation.
3. Define discrete uniform distribution.
4. Obtain the mean of Bernoulli distribution.
5. Obtain the second raw moment of binomial distribution.
6. Obtain the mean of hyper geometric distribution.
7. Define one parameter gamma distribution.
8. Obtain the second raw moment of type - 1 beta distribution.
9. If X follows normal distribution with mean 5 and SD 3 , find the distribution of  $Y = 2X + 5$ .
10. State Lindberg- Levy form of central limit theorem.





11. Define student's t distribution.
12. Define Snedecor's F distribution.

(10×2=20)

### Part B

Answer any **six** questions.

Each question carries **5** marks.

13. Find the first four raw moments and central moments for the following

x	0	1
f(x)	1- p	p

14. Let the joint pdf be  $f(x, y) = 3x^2y + 3xy^2$ ;  $0 < x < 1$ ,  $0 < y < 1$ . Find COV (X, Y).
15. Show that for a Poisson distribution, mean and variance are equal.
16. Find the mean and variance of geometric distribution.
17. If X follows gamma distribution,  $G(m, k + 1)$ , obtain the moment generating function and hence find the mean and variance.
18. Find the arithmetic mean and harmonic mean of type - 2 beta distribution.
19. It is known that on the average  $2/3$  of the seeds of a certain plant germinate. Use Tchebycheff's inequality to obtain an upper bound of the probability that the number germinating will differ from the expected number by more than 10 if 100 seeds are planted.
20. A random sample of size 15 is taken from normal population with mean  $\mu$  and SD 2. What is the probability that the sample mean will differ from the population mean by more than 1.5.
21. Establish the additive property of chi - square distribution.

(6×5=30)

### Part C

Answer any **two** questions.

Each question carries **15** marks.

22. Explain the properties and limitations of moment generating function.
23. If X follows uniform distribution over (a, b), find mean, variance, mean deviation about mean and coefficient of variation.





24. If  $f(x) = (1/\mu) e^{-x/\mu}$ ,  $x > 0$ ,  $\mu > 0$ , obtain the expression for  $r^{\text{th}}$  raw moment. Find mean, SD, interquartile range,  $\beta_1$ ,  $\beta_2$ .
25. (1) State and prove weak law of large numbers.  
(2) Show that the weak law of large numbers is true for the mean of a random sample of size  $n$  from a population with finite mean and variance.

(2×15=30)

