QP CODE: 24027305

24027305

Reg No : ....

Name : ....

B.Sc DEGREE (CBCS) REGULAR / IMPROVEMENT / REAPPEARANCE EXAMINATIONS, OCTOBER 2024

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

FF81F94D

Time: 3 Hours Max. Marks : 80

Part A

*Answer any **ten** questions.*

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

1. If first three raw moments are a, b and c respectively, obtain second and third central moments.
2. Define characteristic function of a random variable with an example.
3. Obtain the mgf of continuous uniform distribution.
4. Define Bernoulli distribution.
5. Define a standardized binomial random variable.
6. Obtain the mean of geometric distribution.
7. Define hyper geometric distribution.
8. Define one parameter gamma distribution.
9. Find the expression for r^{th} raw moment of type - 2 beta distribution.
10. Mention any two disadvantages of Tchebycheff's inequality.
11. Define chi- square distribution.
12. Define Snedecor's F distribution.

(10×2=20)

Part B

*Answer any **six** questions.*

*Each question carries **5** marks.*

13. Show by an example that expectation of the product is equal to the product of the expectations does not imply that the variables are independent.

14. Show that $V(aX + bY) = a^2 V(X) + b^2 V(Y)$ where X and Y are independent random variables.

15. X = 0 or 1 according as an unbiased coin when tossed shows head or tail. Write the pdf of X. Obtain its mgf and hence find the first four raw moments.

16. Find the mean and variance of two parameter gamma distribution.

17. Find the arithmetic mean and harmonic mean of type - 1 beta distribution.

18. Obtain the mean and mean deviation about mean of normal distribution.

19. A sample of size n is taken from a population with mean μ and SD σ . Find the limits within which the sample mean $\overline{x}$ will lie with probability 0.9 by using Tchebycheff's inequality and central limit theorem. Evaluate the limits if n = 64, μ = 10 and σ = 2 .

20. Derive the sampling distribution of mean of sample taken from normal population.

21. Explain an example of a statistic following student's t distribution.

(6×5=30)

Part C

*Answer any **two** questions.*

*Each question carries **15** marks.*

22. The joint pdf of X and Y is given by $f(x, y) = \frac{x+y}{21}$; x = 1, 2, 3 ; y = 1, 2 . Find (1) V(X) (2) V(Y) (3) COV (X, Y).

23. (a) Establish the additive property of Poisson distribution.
    (b) Derive the recurrence relation for central moments of Poisson distribution and hence find variance, β_1 and β_2 .

24. If $f(x) = (1/\mu)\, e^{-x/\mu}$, x > 0, μ> 0, obtain the expression for r^{th} raw moment. Find mean, SD, interquartile range, β_1 , β_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)