



K15U 0161

Reg. No. :

Name :

III Semester B.Sc. Degree (CCSS – Supple./Imp.)
Examination, November 2015
COMPLEMENTARY COURSE IN STATISTICS
3C03 STA : Standard Distributions
(Maths and Comp. Sci.)
(2013 and Earlier Admissions)

Time : 3 Hours

Max. Weightage : 30

Instruction : Use of calculator and statistical tables are **permitted**.

PART – A

Answer **any 10** questions. Weight **1 each**.

1. Define mathematical expectation of a random variable. State its properties.
2. Two unbiased dice are thrown once. Find the expected value of sum of numbers thrown.
3. Define moment generating function of a random variable. Find the m.g.f. of $Y = ax + b$.
4. Define characteristic function of a random variable. State its properties.
5. For a rectangular distribution $f(x) = k$, $1 \leq X \leq 2$, show that $AM > GM$.
6. How does Poisson distribution arise in practice ? Explain with suitable examples.
7. Determine the binomial distribution if mean is 6 and variance is 2.



8. Explain the properties of normal distribution.
9. Find the mean of exponential distribution.
10. If X is a random variable with $E(X) = 3$ and $E(X^2) = 13$, use Chebychev's inequality to find a lower bound for $P(-2 < X < 8)$.
11. State Lindberg-Levy form of central limit theorem. (10×1=10)

PART - B

Answer **any 6** questions. Weight **2 each**.

12. Show that the mathematical expectation of the product of a number of independent random variables is equal to the product of their expectations.
13. If the m.g.f. of a random variable is $\frac{1}{(1-2t)^6}$, find mean and variance.
14. If $f(x, y) = X + Y$, $0 \leq X \leq 1$, $0 \leq Y \leq 1$ find $E[X/Y = y]$.
15. Obtain the recurrence relation for central moments of Binomial distribution.
16. If $X \sim N(\mu, \sigma^2)$ find the mean deviation from mean.
17. If X has a uniform distribution over $[0, 1]$ find the p.d.f. of $Y = -2 \log X$.
18. State and prove weak law of large numbers.
19. State and prove Chebychev's inequality.
20. Define two parameter gamma distribution. Obtain its mean and variance. (6×2=12)



PART - C

Answer **any two** questions. Weight **4 each**.

21. A man with n keys wants to open his door and tries the keys independently at random. Find the mean and variance of the number of trials required to open the door.
 - i) If unsuccessful keys are not eliminated from further selection and
 - ii) If they are.
22. In a normal distribution 7% of items are under 35 and 89% are under 63. Find mean and variance.
23. Prove that Poisson distribution is a limiting case of Binomial distribution.
24. Let X and Y have a joint probability density function $f(X, Y) = \frac{x+2y}{18}$; $x = 1, 2$ and $y = 1, 2$. Find the coefficient of correlation between X and Y . (2×4=8)