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.

P.T.O.

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 in equality 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 $f(x, y) = X + Y,\ 0 \le X \le 1,\ 0 \le Y \le 1$ 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)**
