(Pages : 3) **D – 3075**

Reg. No. : .....

Name : .....

Third Semester B.Sc. Degree Examination, December 2017
First Degree Programme Under CBCSS
Complementary Course for Mathematics
ST 1331.1 : DISTRIBUTION THEORY AND LIMIT THEOREMS
(2013 Admn.)

Time : 3 Hours Max. Marks : 80

PART – A

Answer **all** questions. **Each** question carries **1** mark.

1. Define t distribution. What is the standard error of t distribution ?
2. If F follows $F(n_1, n_2)$. What is the distribution of 1/F ?
3. Write any four application of chi-square distribution.
4. Sum of independent chi-square random variable is
5. Define Geometric distribution. Also write the moment generating function.
6. If X and Y are independent Binomial (n, p) and Binomial (m, p) random variables, respectively. Then what is the distribution of X + Y ?
7. If $X \sim N(\mu, \sigma^2)$, then show that $\frac{(x-\mu)}{\sigma} \sim N(0, 1)$.
8. Define marginal probability distribution function. Give example.
9. Define Exponential Distribution. Write its mean and variance.
10. Define convergence in probability. **(1×10=10 Marks)**

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PART – B

Answer **any 8** questions. **Each** question carries **2** marks.

11. What is the third moment about the mean of a binomial distribution if the second moment about the origin is 12 and n = 30 ?

12. Write down the pmf of the Poisson distribution and write down its first two raw moments.

13. State and prove additive property of Geometric distribution.

14. Show that $M_{ax+b}(t) = e^{bt}M_x(at)$.

15. Find the mean and variance of U(2, 3) random variable.

16. Explain degrees of freedom.

17. What is lack of memory property of geometric distribution ?

18. Define Beta distributions of first and second kind.

19. Define skewness and kurtosis of exponential distribution.

20. State Lind Berg-Levy Central limit theorem.

21. Relationship between t and F distribution.

22. Obtain the Limiting case of t distribution. **(2×8=16 Mark**

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PART – C

Answer **any six** questions. **Each** question carries **4** marks.

23. Show that Normal distribution as limiting case of Binomial distribution.

24. Find the mean and variance of Geometric distribution.

25. If X and Y have independent Gamma distribution. Show that X + Y is also Gamma random variable.

26. Find the MGF (Moment Generating Function) of Exponential Distribution.

27. If X ~ N (0, 1), find the distribution of 1/X.

28. Define Multivariate Normal Distribution. What is its MGF ?

29. Define Multinomial distribution. Compute the mean of components of vector random variable.

30. State and prove Bernoulli's Law of large numbers.

31. Heights of students is normally distributed with mean 165 cms and SD 5 cm. Find the probability that height of a student is

    i) more than 177 cm,

    ii) less than 162 cm.

(6×4=24 Marks)

PART – D

Answer **any two** questions. **Each** question carries **15** marks.

32. Explain sampling distribution. Derive the distribution of sample mean and variance.

33. State and prove Lack of memory property of exponential distribution.

34. State and prove Weak Law of Large numbers.

35. Obtain the moment generating function of Normal distribution. Find mean and variance using MGF.

(2×15=30 Marks)

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