LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **STATISTICS**

FOURTH SEMESTER – **NOVEMBER 2016**

ST 4502/ST 4501 – DISTRIBUTION THEORY

Date: 04-11-2016 Dept. No. Max. : 100 Marks

Time: 01:00-04:00

PART – A

Answer ALL questions: **(10 x 2 = 20 marks)**

1. Define Marginal distribution of x.
2. What do you mean by Stochastic independence of random variables x and y.
3. Define Negative Binomial distribution.
4. Find the mean of Geometric distribution.
5. Obtain the mean of uniform distribution.
6. Define the distribution of a random variable.
7. State and prove the relationship between t and F.
8. Define chi-square distribution.
9. State the distribution of n^{th} order statistic.
10. Define stochastic convergence with an example.

PART – B

Answer any FIVE questions: **(5 x 8 = 40 marks)**

11. Let x and y be random variable, having joint density function

$$f(x)=\begin{cases}\dfrac{6-x-y}{8}, 0\le x\le 2, 2\le y\le 4\\ 0 \quad \text{otherwise}\end{cases}.$$ Find the r_{xy} correlation coefficient.

12. Show that Binomial distribution tends to Poisson distribution under some conditions.
13. Find the mode of Binomial distribution B(n, p).
14. X and Y are independent gamma variates, find the distribution of X+Y using MGF.
15. Explain memory less property. Prove that Exponential distribution has this property.
16. Derive the pdf of t – distribution.
17. Derive the joint density function of i^{th} and j^{th} order statistics.
18. Obtain the mean and variance of Beta distribution of I kind.

PART – C

Answer any TWO questions: **(2 x 20 = 40 marks)**

19. Derive the recurrence relation for the central moments of Binomial distribution. Hence obtain the four moments.
20. a) State and prove the additive property of Normal distribution.
    b) Find the distribution of sample mean and variance, when a sample is taken from normal populations.
21. State and Prove the central limit theorem for i.i.d. random variables.
22. a) Obtain the limiting form of Poisson distribution.
    b) Find the PDF of $X_{(r)}$ in a random sample of size n from the exponential distribution: $f(x)=\alpha e^{-ax}, \alpha>0, x\ge 0$. What is the distribution of $W_1 = X_{(r+1)} - X_{(r)}$?

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