LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FOURTH SEMESTER – APRIL 2011

# ST 4502/ST 4501 - DISTRIBUTION THEORY

Date : 07-04-2011 Dept. No. Max. : 100 Marks

Time : 1:00 - 4:00

**PART - A**

**Answer *ALL* Questions 10 x 2 =20**

1. Define : Independence of random variables
2. Show that under usual notations, .
3. State the additive property of Binomial distribution..
4. Write down the density function of Negative Binomial Distribution.
5. Write E[X|Y=y] when (X,Y) has bivariate normal distribution.
6. What is meant by Lack of Memory Property?.
7. Write the density function of t-statistic with *n* degrees of freedom
8. Define : F Statistic.
9. Write down the general formula for the density function of the first order statistic.
10. Mention the use of Central limit theorem.

**PART - B**

**Answer any FIVE Questions 5 x 8 =40**

1. Find E[X|Y=3], if the joint probability density function of and Y is given by

.

1. Lethave the joint probability density function



Compute the correlation coefficient of X and Y.

1. Establish the additive property of independent Poisson variates.
2. If the moment generating function of a random variable is compute P(X=2 or X=3).
3. Obtain the mean and variance of beta distribution of first kind with parameters *m* and *n*.
4. Show that if X has uniform distribution defined over [0,1] then -2logx has chi-square distribution with 2 degrees of freedom.
5. Let and be independent standard normal variates. Derive the distribution of using the moment generating function method.
6. Find the limiting distribution of sample mean based on a sample of size n drawn from normal distribution with given mean and variance.

**PART - C**

**Answer any *TWO Questions* 2 x 20 =40**

1. (a) Let and  be jointly distributed with density



Find .

(b) Derive the moment generating function of Negative binomial distribution.

1. (a) Show that if X and Y are independent Poisson variates with means and then the

conditional distribution of X given X+Y is binomial.

(b) Obtain the distribution of if X and Y are independent exponential variates with

parameter .

1. (a) Derive the density function of F- distribution.

(b) Derive the moment generating function of chi-square distribution with *n* degrees of freedom

and hence find its mean and variance.

22. Derive the distribution of sample mean and sample variance based on a sample drawn from

normal distribution. Also prove they are independently distributed.

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