LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FOURTH SEMESTER – NOVEMBER 2012

# ST 4502/4501 – DISTRIBUTION THEORY

 Date : 7/11/2012 Dept. No. Max. : 100 Marks

 Time : 1.00 – 4.00

**PART – A**

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

1. Suppose that two dimensional continuous random variable (X, Y) has joint p.d.f. given by 

 Find E (xy).

1. Prove that sum of squares of deviations is minimum when the deviations taken from mean.
2. If X1 and X2 are independent Poisson variates with parameters λ1 and λ2 find the distribution

of X1 + X2.

1. Under what conditions Binomial tends to poisson distribution?
2. Define MGF of a random variable.
3. State the properties of normal distribution.
4. Identify the distribution of sum of n independent exponential variates.
5. Write the pdf of the Laplace distribution.
6. Obtain the distribution of  when X has F(n1, n2).
7. Define Stochastic convergence.

**PART – B**

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

1. The two dimensional random variable (x,y) has the joint density function,



 Find marginal density function of x, y and mean of x, y.

1. Find the recurrence relation for the moments of binomial distribution with parameters n and p.
2. Explain memory less property. Prove that Geometric distribution has this property.
3. Derive the distribution of k th order statistic.
4. Find the moment generating function of Gammma distribution. Hence find the mean and variance.
5. Derive the mean and variance of Beta distribution.
6. State and prove central limit theorem for for iid random variables.
7. Define chi-square variate. Find its probability density function using moment generating function.

**PART – C**

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

1. a) Find the marginal distribution of X and conditional distribution X given Y=y in a bivariate

 normal distribution.

b) State and prove the additive property of poisson distribution.

 20. a) Prove that for a Normal distribution all odd order central moments vanish and find the

 expression for even order moments.

 b) Derive the pdf of t-distribution.

 21. a) Define the Hyper – geometric distribution. Find its mean and variance.

 b) Show that t-distribution tends to standard Normal distribution as 

 22. Identify the distribution of sample mean and sample variance. Also prove that they are

 independently distributed. Assume the parent population is Normal.

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