LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

SECOND SEMESTER – **APRIL 2013**

ST 2503 - CONTINUOUS DISTRIBUTIONS

Date: 30/04/2013 Dept. No. Max. : 100 Marks
Time: 9:00 - 12:00

PART - A

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

1. Define Marginal distribution function of X and Y from their joint distribution function.
2. Define Stochastic Independence.
3. Define standard normal variable and write its p.d.f (probability density function)
4. Mention any two properties of normal distribution.
5. Define Beta distribution of II kind.
6. Define Cauchy distribution
7. If the cumulative distribution function of a continuous random variable X is F(x), find the cumulative distribution function Y=X+a.
8. Define students ‘t’ Distributions with p.d.f.
9. Write the p.d.f. of the largest order statistic $X_{(n)}$.
10. Define stochastic convergence or convergence in probability.

PART - B

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

11. Prove that the Unconditional Expected value of X is equal to the Expectation of the Conditional Expectation of X given Y. (i.e.) E(X) = E[E (X | Y)].
12. Define Uniform Distribution and find its mean and variance.
13. Derive the M.G.F (Moment Generating Function) its mean and variance.
14. Derive the Median of normal Distribution
15. Define Gamma distribution and derive its M.G.F.
16. Let X have a standard Cauchy distribution. Find the p.d.f. of X^2 and identity its distribution.
17. Define Chi-square distribution and derive its M.G.F.
18. Let X_1, $X_{2,\ldots,}$ X_n be a random sample from a continuous distribution. Show that Y_1 = min $(X_1, X_2, \ldots, X_n)$ is exponential with parameter nλ if and only if each X_i is exponential with parameter λ.

PART - C

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

19. a) The joint probability density function of a two clarity random variable (X, Y) is given by

$$f(x, y) = \begin{cases} 2\ ,\ 0 < y < x < 1 \\ 0\ ,\ \ elsewhere \end{cases}$$

. Check whether X and Y are independent. (10 marks)

(OR)

b) Let $f(x\ ,\ y) = \begin{cases} 8xy\ ,\ 0 < x < y < 1 \\ 0\ ,\ \ elsewhere \end{cases}$

Find (i) E(Y |X = x) (ii) Var (Y | X = x). (10 marks)

20. Prove that for the Normal distribution all odd order moments about mean vanish and even order moments about mean are $\mu_{2n} = 1 \cdot 3 \cdot 5 \cdot \cdots (2n - 1)\sigma^{2n}$.
21. Derive the density of student's t distribution and hence find mean and variance.
22. State and prove Lindeberg-Levy central limit theorem.

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