LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

SECOND SEMESTER – **NOVEMBER 2015**

ST 2503 - CONTINUOUS DISTRIBUTIONS

Date : 04/09/2015 Dept. No. Max. : 100 Marks
Time : 09:00-12:00

Section –A

Answer all questions **(10 x 2 =20 Marks)**

1. What do you understand by stochastic independence?
2. Obtain the m.g.f of Uniform distribution.
3. State any two importance of Normal distribution.
4. What are the points of inflexion in Normal distribution?
5. Define Beta distribution of II kind.
6. If X follows standard Cauchy distribution then identify the distribution of X^2.
7. List any two applications of 't' distribution.
8. Under what conditions 'F' distribution tends to Chi-square distribution.
9. Write the p.d.f of a first order statistic.
10. Define stochastic convergence.

Section –B

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

11. Derive the mean and variance of Beta distribution of I kind.
12. Two random variables X and Y have the following j.p.d.f

$$f(x,y)=\begin{cases}2-x-y, & 0\le x\le 1, \quad 0\le y\le 1\\ 0, & otherwise\end{cases}$$

Find (i) Marginal p.d.f of X and Y

(ii) Conditional density functions

(iii) V(X) and V(Y).

13. State the characteristics of Normal distribution.
14. State and prove the additive property of Normal distribution.
15. Show that the Exponential distribution has "lack of memory" property.
16. Show that the ratio of two independent Gamma variates is a β_2 variate.
17. Obtain the m.g.f of Chi-square distribution and hence find mean and variance.
18. Obtain the mean and variance of t distribution.

Section -C

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

19 a) Let $f(x_1, x_2) = \begin{cases} 21x_1^2 x_2^3, & 0 < x_1 < x_2 < 1 \\ 0, & otherwise \end{cases}$ be a j.p.d.f of X_1 and X_2. Find the conditional mean and variance of X_1 given $X_2 = x_2$, $0 < x_2 < 1$ (12)

b) Obtain the mean deviation about mean of Uniform distribution . (8)

20 a) Show that mean, median and mode coincides in Normal distribution. (10)

b) Let a random sample of size n be observed from normal distribution. Show that the sample mean and sample variance are independent. Obtain the distribution of the sample mean and $\frac{nS^2}{\sigma^2}$. (10)

21 a) Derive the density function of 'F' distribution. (12)

b) Show that if $t \approx t_{(n)}$ then $t^2 \approx F(1,n)$. (8)

22 a) State and prove Linderberg-Levy central limit theorem . (12)

b) Derive the pdf of the r^{th} order statistic. (8)

$$$$$$$