LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

SECOND SEMESTER – **APRIL 2022**

16/17/18UST2MC01 – CONTINUOUS DISTRIBUTIONS

Date: 16-06-2022 Dept. No. Max. : 100 Marks

Time: 01:00-04:00

PART A

Answer ALL the questions **(10X2=20)**

1. Write any two properties of a distribution function.
2. Establish the additive property of normal distribution.
3. Define pdf of a random variable X.
4. Find the MGF of rectangular distribution.
5. Define order statistics.
6. Find the distribution function of exponential distribution with parameter θ.
7. Write the density function of Gamma distribution with two parameter **a** and $\boldsymbol{\lambda}$.
8. If $X \sim N(\mu, \sigma^2)$, then write the pdf of $= \frac{X-\mu}{\sigma}$.
9. Find the characteristic function of Cauchy distribution with parameter λ and μ.
10. If $f(x) = 6x(x-1); 0 \leq x \leq 1$, check whether f(x) is a pdf.

PART B

Answer any FIVE questions **(5X8=40)**

11. Find the rth moment of Beta distribution of second kind and hence find its mean and variance.
12. Prove that V(X) = E[V(X|Y)] + V[E(X|Y)].
13. Find the mode and median of normal distribution.
14. If X_1 and X_2 are independent rectangular variates on [0,1], find the distribution of $\frac{X_1}{X_2}$.
15. i) Define bivariate normal distribution.
    ii) Let X and Y are jointly bivariate normal with V(X) = V(Y), show that the two random variables X + Y and X – Y are independent. (4+4)
16. Let X has a standard Cauchy distribution, find the pdf of X^2 and identify its distribution.
17. Find the pdf of a single order statistic $X_{(r)}$.
18. Define exponential distribution and prove its lack of memory property.

PART C

Answer any TWO questions **(2X20=40)**

19. State and prove Lindberg Levy central limit theorem.
20. i) Find the joint pdf of two order statistics $X_{(r)}$ and $X_{(s)}$.
    ii) Find the pdf of rth order statistics of exponential distribution. (13+7)
21. $f(x,y) = \begin{cases} 2 - x - y \ ; 0 \leq x \leq 1, 0 \leq y \leq 1 \\ 0 \ ; \ otherwise \end{cases}$
    i) Find marginal density of X and Y. (6)
    ii) V(X) and V(Y) (8)
    iii) Cov(X,Y) (6)
22. If $X \sim N(0,1)$ find the pdf of X^2 and hence find the MGF of $\chi^2_{(n)}$.

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