LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

SECOND SEMESTER – **APRIL 2024**

UST 2501 – CONTINUOUS DISTRIBUTIONS

Date: 10-04-2024 Dept. No. Max. : 100 Marks
Time: 01:00 PM - 04:00 PM

SECTION A

Answer ALL the Questions **(10 x 2 = 20)**

1. Define probability density function(p.d.f).
2. Define Cumulative Distribution Function (C.D.F)
3. Provide any two properties of C.D.F
4. How would you determine E(X) through M.G.F
5. State the use of standard normal distribution
6. Define Chi-square distribution
7. State any two application of chi-square distriburtion
8. Define first order statistic
9. Define t-distribution
10. Define F-distribution

SECTION B

Answer any FOUR of the following: **(4 x 10 = 40)**

11. The diameter of a electric cable is said to follow a continuous random variable with p.d.f $f(x) = kx(1-x), 0 \le x \le 1$, Find i) value of k ii) Obtain the C.D.F iii) Find the value of a such that $P(X < a) = P(X>a)$ iv) Find $P(X\le 1/2 \mid 1/3 < X < 2/3)$
12. Let $f(x,y) = A\, e^{-x-y}$, $0 < x < y$ and $0 < y < \infty$
    i) Find A ii) M.G.F of X iii) M.G.F of Y iv) Examine X and Y are independent.
13. Derive the m.g.f of standard normal distribution and normal distribution.
14. Derive the m.g.f of two parameter gamma distribution and hence find its mean and variance.
15. For continuous uniform distribution show that $E(X) = (a+b)/2$ and $V(X) = (a-b)^2/12$ and also obtain the M.G.F of continuous uniform distribution.
16. Let $f(x) = 2x, 0 < x < 1$. Find the p.d.f of $Y=8X^3$ and also obtain E(X)
17. Obtain M.G.F, mean and variance of Chi-square distribution
18. Obtain the C.D.F of exponential distribution and establish lack of memory property.

SECTION C

Answer any TWO of the following: **(2 x 20 = 40)**

19. i) Obtain mean and variance of beta distribution of first kind and second kind. (15 marks)
    ii) Discuss the steps involved in fitting of distribution using KS statistic. (5 Marks)
20. i) Prove: Binomial distribution tends to normal distribution as $n\to\infty$. (14 Marks)
    ii) Prove: Linear combination of n independent normal variate is also a normal variate(6 Marks)
21. State and prove Lindberg Levy's Central Limit Theorem
22. Generate random sample of size 20 from exponential distribution with lambda = 1.5

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