TM211900TR

Reg. No :...............................

Name :..................................

M. Sc. DEGREE (C.S.S.) EXAMINATION, NOVEMBER 2021

[2021 Admissions Regular and 2020 Admissions Improvement & Supplementary]

SEMESTER I - CORE COURSE (APPLIED STATISTICS AND DATA ANALYTICS)

ST1C02TM - DISTRIBUTION THEORY

Time : 3 Hours **Maximum Weight : 30**

Part A

I. Answer any Eight questions. Each question carries 1 weight **(8x1=8)**

1. Let 2 independent random variables $X_1$and X_2 have the same geometric distribution and S.T the conditional distribution $\frac{X_1}{X_1+X_2=n}$ is discrete uniform.
2. Give any two application of Hyper geometric distribution
3. Define hyper geometric distribution and find the mean.
4. Check whether Gamma distribution is a member of the exponential family.
5. Define Cauchy distribution.
6. Check whether Poisson family belongs to the one parameter exponential family.
7. If $x \sim N(0,1)$ find the distribution of $y = |x|, -\infty < x \infty$
8. Find the mode of Chi-square distribution.
9. Define chi-square distribution and F distribution.
10. Define t-distribution and state its properties.

Part B

II. Answer any Six questions. Each question carries 2 weight **(6x2=12)**

11. Find mean and variance of Hyper geometric distribution .
12. if X is a Poisson variate such that P(X=2)=9P(X=4)+90P(X=6) find (i) the mean of X (ii) the coefficient of skewness
13. Express Poisson as a limiting form of negative binomial distribution.
14. If X and Y are independent U(0,1) variates , obtain the p.d.f of X-Y
15. Obtain the m.g.f of Beta distribution of first kind.
16. Let x & y be i.i.d R.V's with j.d.f $f(x,y) = 4xy\, e^{(x^2 + y^2)}$; $0 < x < \infty ; 0 < y < \infty$ Find the density function of $u = \sqrt{x^2 + y^2}$
17. Define mean and mode of t-distribution with n d.f.
18. Let X and Y be two independent Chi-square random variables having r_1 *and* r_2 degrees of freedom respectively find the p.d.f $W = \frac{x/r_1}{y/r_2}$

Part C

III. Answer any Two questions. Each question carries 5 weight **(2x5=10)**

19. (a) Sate and prove Lack of Memory property

(b)Fit a geometric distribution to the following data

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20. Let X ~ N(0, 1) and Y ~ N(0, 1) be independent random variables. Obtain the distribution of $\frac{|X|}{|Y|}$

21. Derive the joint distribution of $X_{(r)}$ *and* $X_{(s)}$ the r^{th} *and* s^{th} of order statistics of a random sample of size n from distribution with p.d.f f(x) and cumulative distribution function F(x).

22. In sampling from a normal distribution ,let $x_1\ x_2\ x_3 ......x_n$ be a sample from $N(\mu,\sigma^2)$ and $\overline{X} = \sum \frac{x_i}{n}$ and

$$S^2 = \frac{1}{n-1}\sum(x_i - \overline{x})^2$$

S.T $\overline{X}$ *and* S^2 are independent and derive the expression of S^2.