RAN-2303081201020003

RAN-2303081201020003

M.Sc. (Statistics)(Sem. I) Examination November - 2025

Statistics : Univariate Distributions (Paper - 102)

Time: 3 Hours] **[Total Marks: 70**

સૂચના : / Instructions

(1) ઉપરોક્ત દર્શાવેલ વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fill up strictly the above details on your answer book

(2) Each question carries 14 marks

(3) All questions are compulsory

Seat No.:

Student's Signature

Q. 1 **Attempt any two of the followings:** **14**

(a) If $x_1, x_2,...,x_n$ are i.i.d lognormal random variables then find the distribution of their geometric mean and also find the distribution of $y = x_1^2 x_2^{-3} x_3^{-1}$.

(b) Discuss Truncated Poisson distribution define on set T={1,2, ...} with mean and variance.

(c) Write a detail note on Weibull distribution.

Q. 2 **Attempt any two of the followings:** **14**

(a) Define Power Series distribution. Prove that if the mean and variance of power series distributions are specified than probability mass function can be determined uniquely.

(b) If random variable $P \sim \beta_1(\alpha, \beta)$ and for P = p, random variable $X \sim b(n, p)$ then find the unconditional distribution of X. Also find its mean, variance and moment generating function.

(c) State and prove recurrence relationship for row moments and central moments of Power Series distributions.

Q. 3 **Attempt any two of the followings:** **14**

(a) Write a detail none on non-central t distribution.

b) Define non - central χ^2 distribution. Derive its Pdf using moment generating function.

(c) Write a detailed note on central F-distribution.

Q. 4 **Attempt any two of the followings:** **14**

(a) What is order statistics? Derive probability density function of r^{th} and s^{th} order statistics.

(b) For uniform distribution:

(i) Show that j^{th} order statistic follows beta distribution.

(ii) Show that $g(x_{(1)}/x_{(n)}) \sim \frac{1}{x_{(n)}} \beta(1, n-1)$

(iii) Derive the joint pdf of $x_{(2)}$ and $x_{(4)}$ for n = 5.

(c) Write a detailed note on applications of order statistic in different fields.

Q. 5 **Attempt any two of the followings:** **14**

(a) Derive the limiting form of non-central χ^2 distribution.

(b) Write a detail note on fitting of Neyman type-A distribution by method of moments.

(c) Write a detail note on characteristic function of Laplace distribution.

———————