B-003-1171004 Seat No. _____

M. Sc. (Theory) (Sem. I) (CBCS) Examination

March - 2021

MS - 104 : Statistics

(Probability & Distribution Theory)

Faculty Code : 003

Subject Code : 1171004

Time : $2\frac{1}{2}$ Hours] [Total Marks : **70**

Instructions : (1) Attempt all questions.
(2) Each question carries equal marks.

1 Answer the following questions : (any **seven**) **14**

(1) Which continuous distribution contains equal mean and variance ?

(2) The density of non–central χ^2 distribution is a mixture of which distribution ?

(3) Give brief idea of Conditional probability.

(4) From Holder's inequality we can get which inequality ?

(5) Give a brief idea of convergence in r^{th} mean.

(6) What is the moment generating function of power series distribution ?

(7) What is the mean and variance of binomial distribution as a particular case of power series distribution ?

(8) What is meant by probability ?

(9) Write the p.d.f. of single order statistics.

(10) Define Weak Law of Large Number.

2 Answer the following questions : (any **two**) **14**

(1) Find the joint probability density function of two order statistics.

(2) Define Power series distribution. Find its mean and variance.

(3) Show that zero Truncated Poisson distribution is a particular case of Power series distribution.

3 Answer the following questions. **14**

(1) If $X \sim X^2_{(m)}(\lambda)$ and $Y \sim X^2_{(n)}$ be independent, then show that $\frac{X/m}{Y/n}$ has non-central F-distribution.

(2) Define the moment generating function of any random variable X.

OR

3 Answer the following questions : **14**

(3) State and prove the Uniqueness theorem.

(4) State and prove Minkowski's inequality.

4 Answer the following questions : (any **two**) **14**

(1) Recurrence relation between row moments, prove that

$$\mu'_{r+1} = \theta \frac{d\mu'_r}{d\theta} + \mu'_1 \mu'_r$$

(2) Define characteristic function. Find characteristic function of Normal distribution.

(3) Explain Convergence in probability with related example.

5 Answer the following questions : (any **two**) **14**

(1) Define Binomial distribution as a particular case of power series distribution.

(2) Find moment generating function and cumulative generating function of non-central χ^2 distribution.

(3) State and prove Holder's inequality.

(4) For the joint probability distribution of two random variables x and y given below :

X/Y	1	2	3	4
1	4/36	3/36	2/36	1/36
2	1/36	3/36	3/36	2/36
3	5/36	1/36	1/36	1/36
4	1/36	2/36	1/36	5/36

Find

(i) The marginal distributions of X and Y.

(ii) Conditional distribution of X given the value of Y = 1 and that of Y given the value of X = 2.
