(This question paper contains 2 printed pages)

S.No. of Question Paper

Unique Paper Code	:	32371101
Name of the Course	:	B.Sc. (H) Statistics Under CBCS
Name/Title of the Paper	:	Descriptive Statistics
Semester	:	I
Duration	:	2 hours
Max. Marks	:	75

Instructions for candidates

Attempt 4 questions in all. All questions carry equal marks.

1. The random variable X takes the values $1,2,3,\dots,n$ and $P(X=k)$ is inversely proportional to $k(k+1)$.

   Find

   (i) probability mass function of X,

   (ii) Probability distribution function of random variable X,

   (iii) quartiles of X.

2. If X is a discrete random variable such that its deviations are small compared with its arithmetic mean (M), so that $\left(\frac{x}{M}\right)^3$ and higher powers of $\left(\frac{x}{M}\right)$ may be neglected, then prove that Arithmetic mean(M), Geometric mean(G) and harmonic mean(H) of X are in Geometric Progression (G.P). Further, prove that M^2 , G^2 and H^2 are also in G.P.

3. The probability density function of a continuous random variable X is given by

$$f(x) = \frac{k}{(1+x^2)} \ , -\infty < x < \infty.$$

   (i) Find the value of k and its distribution function.

   (ii) If random variable X is transformed to a random variable Y by

$$Y = \frac{tan^{-1}(X)}{\pi} + \frac{1}{2} \ ,$$

   Find probability density function, E(Y), E(Y^2) and variance of random variable Y.

4. If the joint distribution function of X and Y is given by:

$$F(x, y) = \begin{cases} k\,(1- e^{-x})\,(1- e^{-y}) & ; \text{ for } x > 0 \text{ , } y > 0 \\ 0 & ; \text{ otherwise} \end{cases}$$

   Find

(i) the constant k,

(ii) P (1 < X <3 , 1 < Y <2),

(iii) joint p.d.f. of (X,Y),

(iv) marginal p.d.f. and distribution function of Y.

Also, examine the independence of random variables X and Y.

5. Given that $(A) = (B) = (C) = N/2$ and $(AB) = (AC) = pN$. If $(BC)/N \geq M$, find the greatest and least values of p.

6. An urn A contains 5 white and 3 black balls. Another urn B contains 3 white and 5 black balls. Four balls are taken from urn A randomly and transferred to urn B. Now one ball is drawn randomly from urn B and it is found to be white. What is the probability that three white and one black ball were transferred from urn A to urn B ?