(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   :   3 hours

Max. Marks: 75

Instructions for candidates
Attempt 4 questions in all. All questions carry equal marks.

1. In a discrete distribution, deviations (x) are small compared with mean M so that $\left(\dfrac{x}{M}\right)^3$ and higher powers of $\left(\dfrac{x}{M}\right)$ are neglected. Prove that $MH = G^2$ where G is the Geometric mean and H is the Harmonic mean of the distribution.

2. Let X be a random variable with p.d.f.

    $$f_x(x) = \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{1}{2}x^2\right) \quad ; \quad -\infty < x < \infty$$

    Find the p.d.f. of

    (i) $Y = 3X + 2$

    (ii) $Z = X^2$

3. Eight tickets numbered 111, 121, 122, 122, 211, 212, 212, 221 are placed in an urn and stirred. One of them is then drawn at random.

    Let

    A be the event that the first digit on the ticket drawn is l ,

    B be the event that second digit on the ticket drawn is l and

    C be the event that the third digit on the ticket drawn is l.

    Show that

    (i) $P(A \cap B \cap C) = P(A)P(B)P(C)$

    (ii) Discuss the pairwise independence of the events A, B and C.

4. Let X be a random variable with p.d.f given by

$$f(x) = k\,e^{-x/\sigma} \quad ; \qquad 0 \le x < \infty, \sigma > 0.$$

Find

(i) the constant k.

(ii) r^{th} moment about origin μ_r', r = 1,2,3,4.

(iii) r^{th} moment about mean μ_r, r = 1,2,3,4.

Hence find mean, standard deviation, coefficient of skewness β_1 and coefficient of kurtosis β_2.

5. Define Yule's coefficient of association. Find its limits.

Find the association between Proficiency in English and in Hindi among candidates at a certain test if 245 of them passed in Hindi, 285 failed in Hindi, 190 failed in Hindi but passed in English and 147 passed in both. Also find remaining frequencies.

6. Let (X, Y) be bivariate random variables with joint p.d.f

$$f(x,y) = \frac{1}{8}\,(6 - x - y) \quad ; \qquad 0 \le x \le 2,\ 2 \le y \le 4.$$

Find

(i) marginal p.d.f of random variable X.

(ii) conditional p.d.f of Y given X= x.

(iii) P (X < 1), P (X < 3, Y < 1).

Also comment on the independence of X and Y.