(i) the first time

(ii) the second time

(iii) both times.

(b) If A, B, C are pair-wise independent events and A is independent of $(B \cup C)$, then show that A, B and C are mutually independent. 6,6

7. (a) A nurse is supposed to give the patient a pill each day. The probability that the nurse forgets to give the pill is 0.40. If the patient receives the pill, the probability that he will die is 0.25. If he does not get the pill, the probability that he will die is 0.80. Find the probability that the nurse forgot to give the pill to the patient who died.

(b) In a population with three attributes A, B, C :
$N = 100, (A) = 50, (B) = 60, (C) = 50, (A\beta) = 5, (A\alpha) = 20$.
Find the greatest and the least possible values of (BC) so that the data may be consistent. 6,6

8. (a) Two computers A and B are to be marketed. The salesman who is assigned the job of finding customers for them has 60% and 40% chances respectively of succeeding in case of computer A and B. The two computers can be sold independently. Find :

(i) The probability that at least one computer is sold,

(ii) The computer A has been sold given that at least one is sold.

(b) Define Yule's coefficient of association (Q). Show that $-1 \leq Q \leq 1$. Find Q :

(i) If all A's are B's.

(ii) If no A's are B's. 6,6

7/12/18 (M)

This question paper contains 4 printed pages.

Your Roll No. .....

I

Sl. No. of Ques. Paper	**: 116**
Unique Paper Code	**: 32371101**
Name of Paper	**: Descriptive Statistics**
Name of Course	**: B.Sc. (Hons.) Statistics**
Semester	**: I**
Duration	**: 3 hours**
Maximum Marks	**: 75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

*Attempt **six** questions in all.*

*Question No. **1** is compulsory.*

*Attempt **five** more questions selecting **three** questions from Section A and **two** questions from Section B.*

Use of simple calculator is allowed.

1. (a) Fill in the blanks :

(i) The point of intersection of less than ogive and more than ogive corresponds to ..... .

(ii) The total number of ultimate class frequencies of n attributes is ..... .

(iii) For symmetrical distribution, γ_1 = ...

(iv) The limits of partial correlation coefficients are ..... .

(v) For a frequency distribution, C.V. = 5 and $\sigma = 2$. Mean of the distribution will be ..... .

P.T.O.

(b) Let $P(A) = 0.4$, $P(A \cup B) = 0.7$. Find $P(B)$ so that A and B are mutually exclusive. Also find $P(A|B)$.

(c) Two independent variables X and Y have the variances 36 and 16 respectively. Find $r(X + Y, X - Y)$.

(d) The mode and variance of a distribution are 16 and 64 respectively. If each observation of the distribution is multiplied by –2, find the new mode and standard deviation.

(e) In a population with two attributes A and B, N = 100, (A) = 60, (B) = 50, (AB) = 5. Find other class frequencies and comment on consistency of data.

(f) Write normal equations for fitting the curve $\frac{Y}{X} = a + bX$ by the method of least squares. 1×5,2,2,2,2,2)

SECTION A

2. (a) "Measures of central tendency, dispersion, skewness and kurtosis are complementary to one another in understanding a frequency distribution." Explain.

(b) Let X be a variable taking the values 0, 1, 2, ..., n with frequencies proportional to $\binom{n}{0}, \binom{n}{1}, \binom{n}{2}, \ldots\ldots, \binom{n}{n}$ respectively. Find (i) mean, (ii) mean square deviation about $x = 0$, (iii) variance. 6,6

3. (a) The mean and standard deviation of a variable X are m and σ respectively. If the deviations are small as compared with the value of the mean, show that $G = m\left(1 - \frac{\sigma^2}{2m^2}\right)$ approximately, where G is the Geometric Mean.

(b) Define Pearsonian coefficients β_1 and β_2. Discuss their utility in statistics. Also show that $\beta_2 \geq 1$ for any distribution. 6,6

4. (a) Define Spearman's rank correlation coefficient ρ and show that it is given by :

$$\rho = 1 - \frac{6\sum d_i^2}{n\left(n^2 - 1\right)},$$

where, d_i is the difference between the ranks for i^{th} individual $i = 1, 2, \ldots\ldots, n$. Also, state the limits of ρ and comment on it.

(b) Explain the terms :

(i) Curve fitting

(ii) Principle of least squares.

Fit the curve $Y = ax + bx^2$ to a set of points (–3, 21), (–2, 8), (–1, 1), (1, 5), (2, 16), (3, 33). 6,6

5. (a) Find the angle θ between two regression lines. Also discuss the cases if :

(i) $\theta = 0$ (ii) $\theta = 90°$

(b) Explain the following Yule's notations :

(i) $b_{12.3}$ (ii) $e_{1.23}$

(iii) $x_{1.23}$ (iv) $r_{12.3}$

(v) $R_{1.23}$ (vi) $\sigma^2_{1.23}$ 6,6

SECTION B

6. (a) Among the digits 1, 2, 3, 4, 5; two selections are made without replacement. Find the probability that an odd digit will be selected :