(c) Find the coefficient of correlation between the value of X and Y :

X	Y
1	8
3	12
5	15
7	17
8	18
10	20

Unit—V

5. (a) Calculate the S. D. and coefficient of variation (C. V.) for the following table :

Class	Frequency
0—10	5
10—20	10
20—30	20
30—40	40
40—50	30
50—60	20
60—70	10
70—80	5

(b) Explain constants of the Poisson's distribution moments about the origin.

Roll No. ....

Note : Attempt any *two* parts from each question. All questions carry equal marks. Only simple calculator is allowed.

Unit—I

1. (a) Find the value of :

$$\lim_{x \to \infty} \left(1 + \frac{1}{x^2} \right)^2.$$

(b) Test for continuity of the following function at $x = 0$:

$$f(x) = \begin{cases} \dfrac{1 - \cos x}{x^2} & , x \neq 0 \\ 1 & , x = 0 \end{cases}$$

(c) Evaluate right hand and left hand derivatives of the function :

$$f(x) = \begin{cases} x \tan^{-1}\left(\dfrac{1}{x}\right) & \text{, when } x \neq 0 \\ 0 & \text{, when } x = 0 \end{cases}$$

at $x = 0$. Is $f(x)$ differentiable at $x = 0$?

Unit—II

2. (a) Find the differential coefficient of $\log \sin^{-1} x^4$.

(b) If :

$$\sin y = x \sin (a + y),$$

prove that :

$$\frac{dy}{dx} = \frac{\sin (a + y)}{\cos y - x \cos (a + y)}$$

(c) Find $\dfrac{dy}{dx}$, when :

$$x = a \cos^3 t$$

$$y = a \sin^3 t$$

Unit—III

3. (a) Find the points on the curve :

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

the tangent at which are perpendicular to x-axis.

(b) Find the intervals in which the function :

$$f(x) = 2x^3 - 3x^2 - 36x + 40$$

in (a) strictly increasing (b) strictly decreasing.

(c) If $x + y = 10$, then find the maximum value of xy.

Unit—IV

4. (a) The odds against a certain event are 5 to 2 and the odds in favour of another event, independent of the former, are 6 to 5. Find the odds that one at least of the events will happen.

(b) A card is drawn from an ordinary pack of cards and a player bets that it is a spade or an ace. What are the odds against his winning the bet ?

(c) If the chance of A, winning a certain race be $\dfrac{1}{6}$ and the chance of B winning it be $\dfrac{1}{8}$, what is the chance that neither should win ?

Unit—V

5. (a) Calculate the S. D. and coefficient of variation (C. V.) for the following table :

Class	Frequency
0—10	5
10—20	10
20—30	20
30—40	40
40—50	30
50—60	20
60—70	10
70—80	5

(b) Explain constants of the Poisson's distribution moments about the origin.