Q4.Find the curve of second degree of regression of y on x () to the following data by method of least square :

x 1 2 3 4
y 6 11 18 27

ANSWER:

Sol. We form the following table:

x	y	x^2	x^3	x^4	xy	x^2y
1	6	1	1	1	6	6
2	11	4	8	16	22	44
3	18	9	27	81	54	162
4	27	16	64	256	108	432
$\Sigma x = 10$	$\Sigma y = 62$	$\Sigma x^2 = 30$	$\Sigma x^3 = 100$	$\Sigma x^4 = 354$	$\Sigma xy = 190$	$\Sigma x^2y = 644$

The equation of second degree parabola is given by

$$y = a + bx + cx^2 \qquad \ldots(1)$$

And the normal equations are

$$\Sigma y = an + b\Sigma x + c\Sigma x^2 \qquad \ldots(2)$$

$$\Sigma xy = a\Sigma x + b\Sigma x^2 + c\Sigma x^3 \qquad \ldots(3)$$

$$\Sigma x^2y = a\Sigma x^2 + b\Sigma x^3 + c\Sigma x^4 \qquad \ldots(4)$$

$$\Rightarrow \quad \left.\begin{aligned} 4a + 10b + 30c &= 62 \\ 10a + 30b + 100c &= 190 \\ 30a + 100b + 354c &= 644 \end{aligned}\right\} \Rightarrow a = 3, b = 2, c = 1$$

Hence $y = 3 + 2x + x^2$. **Ans.**