$\therefore$ ① becomes

$$\Delta y = 2x^{(3)} + 9x^{(2)} + 4$$

$$y = 2\frac{1}{\Delta}x^{(3)} + 9\frac{1}{\Delta}x^{(2)} + \frac{4}{\Delta}$$

$$= 2\frac{x^{(4)}}{4} + 9\frac{x^{(3)}}{3} + 4x^{(1)} + K$$

$$= \frac{x^{(4)}}{2} + 3x^{(3)} + 4x^{(1)} + K$$

$$= \frac{x(x-1)(x-2)(x-3)}{2} + 3x(x-1)(x-2) + 4x + K$$

$$= \frac{x^4 - 6x^3 + 11x^2 - 6x}{2} + 3(x^3 - 3x^2 + 2x) + 4x + K$$

$$= \frac{1}{2}x^4 - \cancel{3x^3} + \frac{11}{2}x^2 - 3x + \cancel{3x^3} - 9x^2 + 6x + 4x + K$$

$$\therefore\ y = \frac{1}{2}x^4 - \frac{7}{2}x^2 + 7x + K$$

11) Represent a function $f(x) = 11x^4 + 5x^3 + 2x^2 + x - 15$ and its sucessive difference in factorial notation with interval 2.

Ans: **1st Method :**

let $f(x) = 11x^4 + 5x^3 + 2x^2 + x - 15$ —— ①

$$\Rightarrow 11x^4 + 5x^3 + 2x^2 + x - 15 = 11x^{(4)} + Ax^{(3)} + Bx^{(2)} + Cx^{(1)} + D$$