Section - 4

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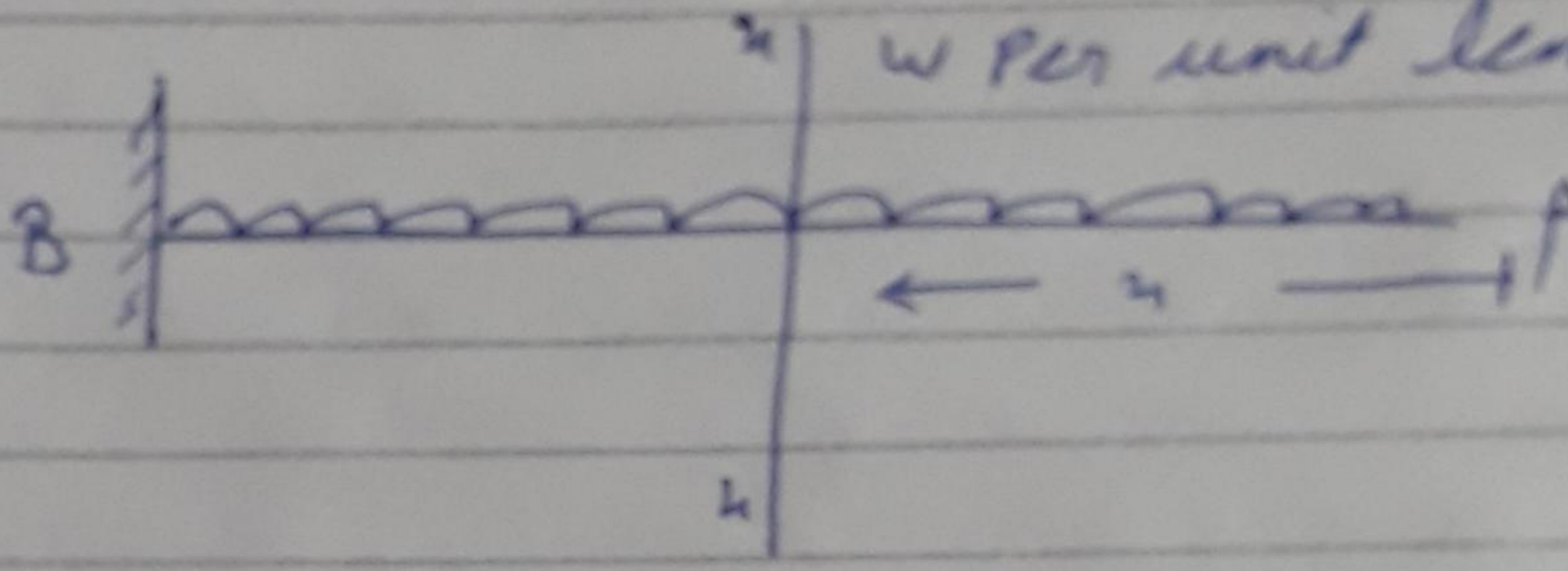

Let us consider a beam AB length l carrying uniformly distributed load w per unit length. Take section XX at a distance x from the free end A.

Moment at XX section;

$$M_x = w_x \frac{x}{2} = -\frac{wx^2}{2}$$

$$M_x = EI \frac{d^2y}{dx^2}$$

both are equal

$$EI \frac{d^2y}{dx^2} = -\frac{wx^2}{2}$$

$$EI \frac{dy}{dx} = -\frac{wx^3}{6} + C_1$$

$$EIy = -\frac{wx^4}{24} + C_1 x + C_2$$

Boundary conditions.

$$x = l, y = 0, \frac{dy}{dx} = 0$$

$$EI \times 0 = -\frac{wl^3}{6} + C_1$$

$$C_1 = \frac{wl^3}{6}$$

$$EI \times 0 = -\frac{wl^4}{24} + \frac{wl^3}{6} \times l + C_2$$

$$C_2 = -\frac{wl^4}{8}$$

Put the value of C_1 & C_2 in eq

$$EIy = \frac{wx^4}{24} + \frac{wl^3}{6} x - \frac{wl^4}{8}$$

This is deflection eq

$$y = \frac{wl^4}{8EI}$$