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15/ENG03/011

CIVIL ENGINEERING

ENG 381

Assignment II

$$1) \quad EI \frac{d^2y}{dx^2} = \frac{w}{2} (l-x)^2$$

Solution

C.F

$$EI m^2 = 0$$

$$m^2 = 0$$

$$m = \sqrt{0}$$

$$m = 0$$

$$y = e^{0x} (A + Bx)$$

$$y = A + Bx$$

P.I

$$y = Gx^2 + Hx^3 + Zx^4$$

$$\frac{dy}{dx} = 2Gx + 3Hx^2 + 4Zx^3$$

$$\frac{d^2y}{dx^2} = 2G + 6Hx + 12Zx^2$$

$$EI(2G + 6Hx + 12Zx^2) = \frac{w}{2} (l-x)^2$$

$$2GEI + 6HxEI + 12Zx^2EI = \frac{w}{2} (l^2 - 2lx + x^2)$$

$$4GEI + 12HxEI + 24Zx^2EI = w(l^2 - 2lx + x^2)$$

Comparing coefficient

$$24GEI = w$$

$$I = \frac{w}{24EI}$$

$$I = \frac{w}{24EI}$$

$$12HI = -2wl$$

$$H = \frac{-2wl}{12EI}$$

$$H = \frac{-wl}{6EI}$$

$$H = \frac{-wl}{6EI}$$

$$HI = wl^2$$

$$I = \frac{wl^2}{4EI}$$

$$y = \left(\frac{wl^2}{4EI}\right)x^2 - \left(\frac{-wl}{6EI}\right)x^3 + \left(\frac{w}{24EI}\right)x^4$$

$$y = \frac{wl^2x^2}{4EI} - \frac{wlx^3}{6EI} + \frac{wx^4}{24EI}$$

$$y = \frac{6wl^2x^2 - 4wlx^3 + wx^4}{24EI}$$

$$y = \frac{w}{24EI} (6l^2x^2 - 4lx^3 + x^4)$$

C.S

$$y = A + Bx - \frac{w}{24EI} (6l^2x^2 - 4lx^3 + x^4)$$

$$\text{at } y=0, x=0 \quad \frac{dy}{dx} = 0$$

$$0 = A$$

$$A = 0$$

$$\frac{dy}{dx} = B + \frac{w}{24EI} (12l^2x - 12lx^2 + 4x^3)$$

$$0 = B + \frac{w}{24EI} (12l^3(0) - 12l(0)^2 + 4(0)^3)$$

$$B = 0$$

P.S

$$y = \frac{w}{24EI} (6L^2x^2 - 4Lx^3 + x^4)$$

$$y = \frac{w}{24EI} x^2 (6L^2 - 4Lx + x^2)$$

$$x = L$$

$$y = \frac{wL^3}{24EI} (6L^2 - 4L^2 + L^2)$$

$$y = \frac{wL^3}{24EI} (3L^2)$$

$$y = \frac{3wL^4}{24EI}$$