

15/ENG-031030

SMOOTH SIMON

CIVIL ENGINEERING

ENG 381

Assignment 11

$$EI \frac{d^3y}{dx^3} = \frac{w}{2} (L-x)^2$$

Solution

CF

$$EI m^3 = 0$$

$$m^3 = 0$$

$$m = \sqrt[3]{0}$$

$$m = 0$$

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

$$y = A + Bx$$

P.I

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

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

$$\frac{d^2y}{dx^2} = 6Gx + 2H + 12Zx^2$$

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

$$24GEI + 6Hx EI + 12Zx^2 EI = \frac{w}{2} (L^2 - 2Lx + x^2)$$

$$4GEI + 12H EI + 24Lx^2 EI = w (L^2 - 2Lx + x^2)$$

Comparing coefficient

$$24GEI = w$$

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

$$12H EI = -2wL$$

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

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

$$4GEI = wL^2$$

$$G = \frac{wL^2}{4EI}$$

$$y = \frac{wl^2}{24EI} (3l^2)$$

$$y = \frac{3wl^2}{24EI}$$

$$y = \frac{wl^2}{8EI}$$

151ENR031030

SMOOTH SIMON

CIVIL ENGINEERING

ENG 381

Assignment 11

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

Solution

CF

$$EI m^2 = 0$$

$$m^2 = 0$$

$$m = \sqrt{0}$$

$$m = 0$$

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

$$y = A + Bx$$

P.I

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

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

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

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

$$2GEI + 6Hx EI + 12Zx^2 EI = \frac{w}{2} (L^2 - 2Lx + x^2)$$

$$4GEI + 12Hx EI + 24Zx^2 EI = w (L^2 - 2Lx + x^2)$$

Comparing coefficient

$$24ZEI = w$$

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

$$12H EI = -2wL$$

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

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

$$4GEI = wL^2$$

$$G = \frac{wL^2}{4EI}$$

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

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

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

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

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

G.S

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

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

$$0 = A + B(0) + \frac{w}{24EI} (6l^2(0)^2 - 4l(0)^3 + 0^4)$$

$$0 = A$$

$$A = 0$$

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

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

$$0 = B$$

P.S

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

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

$$x = l$$

$$y = \frac{wl^2}{24EI} (6l^2 - 4l^2 + l^2)$$