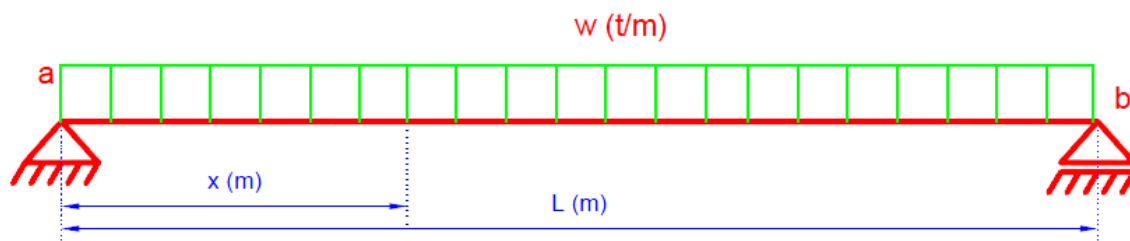


Problem 3

For a simple beam with span L (m) loaded by a uniform distributed load w (t/m)

- 1- Find the general equation of shear force and bending moment
- 2- Find the type of variation along span for shear and moment
- 3- Find shear force and bending moment at mid span
- 4- Draw S.F.D and B.M.D



SOL.

REACTION.

$$X_a = 0$$

$$Y_a = Y_b = wL/2$$

To find the general equation assume a distance X vary from point (a) to point (b) along the beam

i- Shear force calculation

1- General equation is

$$Q = \frac{wL}{2} - wx$$

2- From general equation the type of variation along span is linear variation because general equation contain the variable (x)

3- At mid span $x = \frac{L}{2}$

Sub in general equation

$$Q = \frac{wL}{2} - \frac{wL}{2} = 0$$

ii- Bending moment calculation

1- General equation is

$$M = \frac{wL}{2} x - \frac{wx}{2} x = \frac{wLx}{2} - \frac{wx^2}{2}$$

2- From general equation the type of variation along span is parabolic variation because general equation contain the variables (x and x^2)

3- At mid span $x = \frac{L}{2}$

Sub in general equation

$$M = \frac{wL^2}{4} - \frac{wL^2}{8} = \frac{wL^2}{8}$$

