FAQ's

1. Discuss the concept of the moment area method?

The moment-area method is one of the most effective methods for obtaining the bending displacement in beams and frames. In this method, the area of the bending moment diagrams is utilized for computing the slope and deflections at particular points along the axis of the beam or frame.

Theorem1

The change in slope between the tangents drawn to the elastic curve at any two points A and B is equal to the product of 1/EI multiplied by the area of the moment diagram between these two points.

$\theta_{AB}=(Area_{AB})/EI$

Theorem2

The deviation of any point B relative to the tangent drawn to the elastic curve at any other point A, in a direction perpendicular to the original position of the beam, is equal to the product of 1/EI multiplied by the moment of an area about B of that part of the moment diagram between points A and B.

$T_{B/A} = (Area_{AB})\ (\bar{X}_B)/EI$

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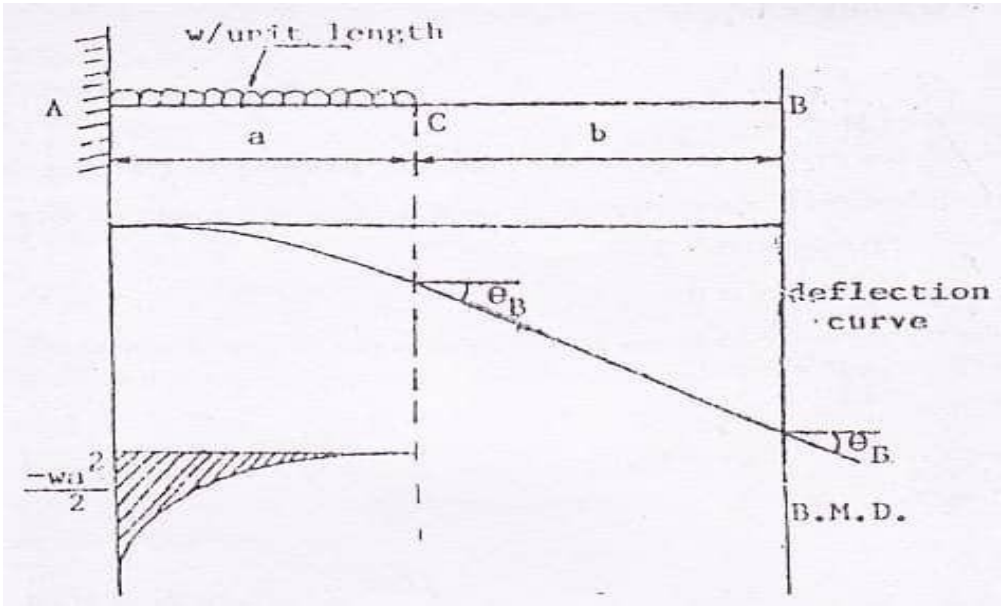
2. Calculate the slope and deflection of the given figure using moment area method?



To find the slope

$$\theta_B = \theta_C = \frac{(\text{Area of BMD between A and C})}{EI}$$

$$= \frac{wa^2}{2} * a * \frac{1}{3} * \frac{1}{EI}$$

$$= \frac{wa^3}{6EI}$$

To find the deflection at centre C

$$\delta_C = \frac{(\text{Moment of area of the BMD between A and C about C})}{EI}$$

$$= \frac{wa^3}{2} * \frac{3}{4}a * \frac{1}{EI}$$

$$= \frac{3wa^4}{24EI}$$

$$\delta_B = \delta_C + (l-a)\theta_B$$

$$= \frac{3wa^4}{24EI} + (l-a) * \frac{wa^3}{6EI}$$

$$= \frac{wa^3}{24EI} * (4l-a)$$