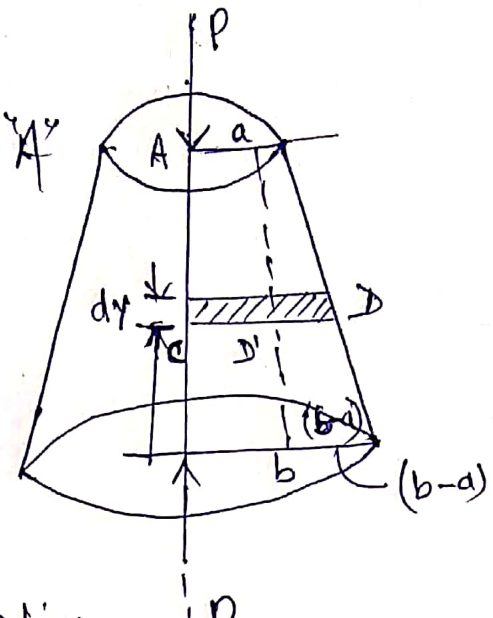
Q) Solⁿ:-

find the deflection of point 'A'



Deflection of point 'A' is Nothing but overall deflection of the Member (δ)

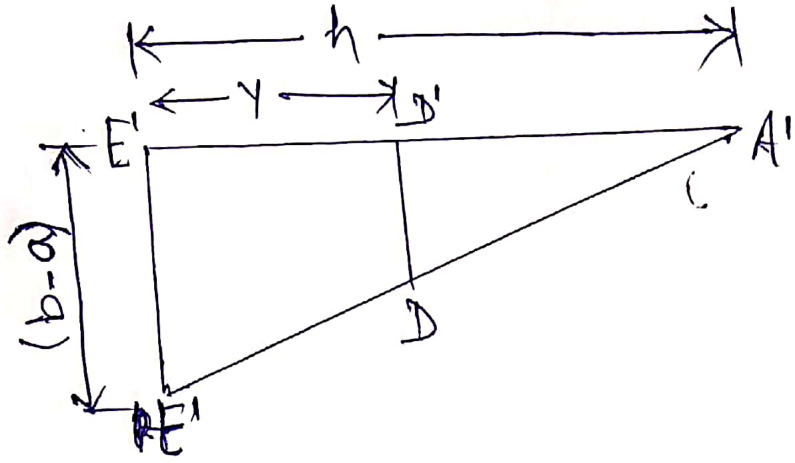
- for varying cross-section Deflection.

$$V_A = \delta = \int_0^h \frac{P_x dx}{A_x E_x} = \int_0^h \frac{P_y dy}{A_y E_y}$$

$$\therefore A_y = \pi(CD^2) = \pi(CD' + D'D)^2$$

"D'D" is to be evaluated

"A_y" is the Area at Particular distance y from reference.



from the Similar triangles.

$$\frac{b-a}{h} = \frac{DD'}{h-y}$$

$$DD' = \frac{(b-a)}{h}(h-y)$$

$$\therefore A_y = \pi\left[a + \frac{(b-a)}{h}(h-y)\right]^2$$

$$A_y = \pi\left(b + \frac{(a-b)}{h}y\right)^2$$

$$U_y = \delta = \int_0^h \frac{P\,dy}{\pi E\left(b + \frac{(a-b)}{h}y\right)^2}$$

$$U_A = \frac{h}{(a-b)} \times \frac{P}{\pi E}\left[\frac{-1}{\left(b + \frac{(a-b)}{h}y\right.}\right]_0^b$$

$$= \frac{Ph}{\pi E(a-b)}\left[\frac{-1}{a} + \frac{1}{b}\right]$$

$$= \frac{Ph}{\pi E(a-b)}\left[\frac{-b+a}{ab}\right]$$

$$\boxed{U_A = \frac{Ph}{\pi E ab}}$$

Deflection of point "A" $\boxed{U_A = \frac{Ph}{\pi E ab}}$