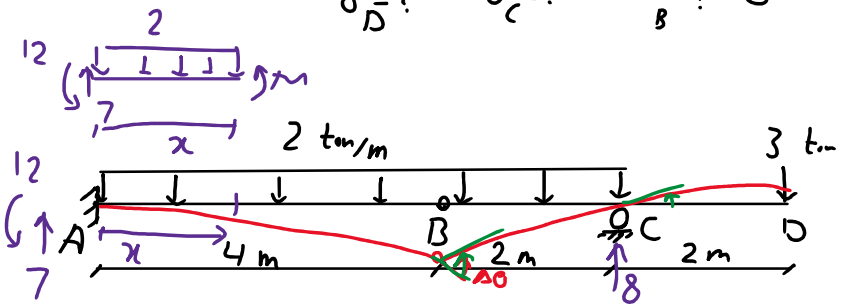
Deflection7

Thursday, November 16, 2023 18:40

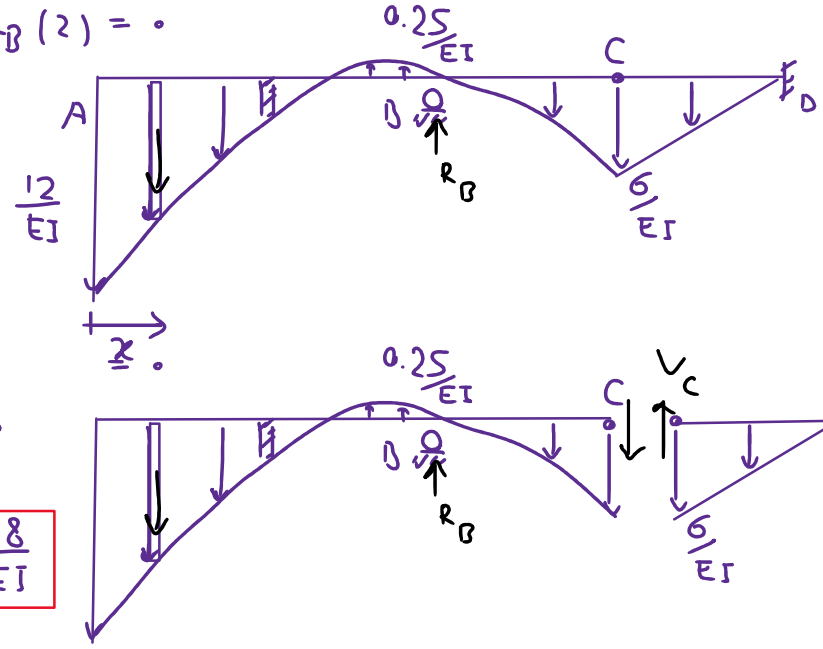
مثال: $\delta_D = ?$ $\theta_C = ?$ $\Delta\theta_B = ?$



$M = -12 + 7x - x^2$

$\circlearrowleft \sum M_C = 0 \rightarrow$

$$\int_0^6 \frac{1}{EI}(-12+7x-x^2)(6-x)\,dx + R_B(2) = 0$$



$$\frac{-72}{EI} + R_B(2) = 0 \rightarrow \Delta\theta = R_B = \frac{36}{EI}$$

سطح زیر نمودار

$\sum F_y = 0$

$$\int_0^6 \frac{1}{EI}(-12+7x-x^2)\,dx + \frac{36}{EI} - V_C = 0$$

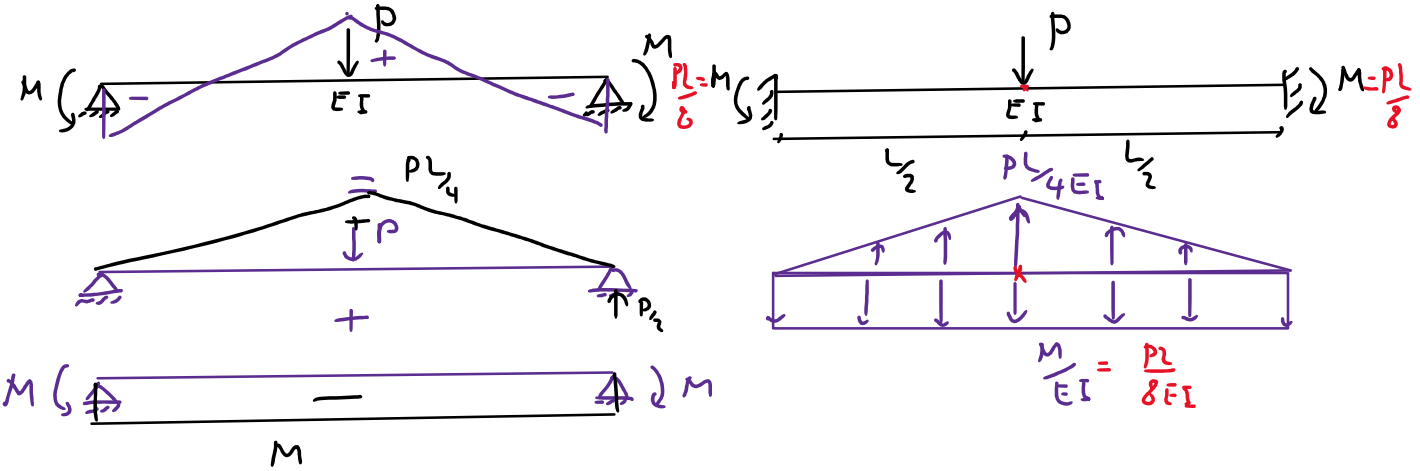
$$-\frac{18}{EI} + \frac{36}{EI} - V_C = 0 \rightarrow \theta = V_C = \frac{18}{EI}$$

سطح زیر نمودار

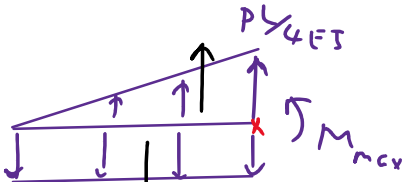
$$M_D = \left(\frac{18}{EI}\right)(2) - \frac{1}{2}\left(\frac{6}{EI}\right)(2)\left(\frac{2}{3}\times 2\right) = \frac{28}{EI}$$

$$\delta_D = M_D = \frac{28}{EI} \uparrow$$

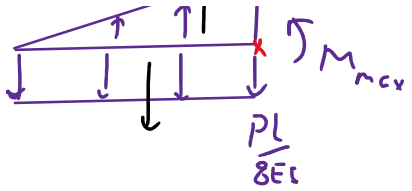
مثال: تغییر مکان ماکزیمم تیر شکل زیر را به دست آورید.



$$\sum F_y = 0 \rightarrow \frac{1}{2}\left(\frac{PL}{4EI}\right)(L) - \left(\frac{M}{EI}\right)(L) = 0 \rightarrow M = \frac{PL}{8}$$



$$M = \frac{1}{2}\left(\frac{PL}{4EI}\right)(L)\left(\frac{1}{3}\times L\right) - \left(\frac{PL}{4EI}\right)(L)(L) =$$



$$M_{max} = \frac{1}{2}\left(\frac{PL}{4EI}\right)\left(\frac{L}{2}\right)\left(\frac{1}{3}\times\frac{L}{2}\right) - \left(\frac{PL}{8EI}\right)\left(\frac{L}{2}\right)\left(\frac{L}{4}\right) =$$

$$\frac{2-3}{32\times3\times2}\,\frac{PL^3}{EI}$$

$$\delta_{max} = M_{max} = \frac{-1}{192}\,\frac{PL^3}{EI}$$