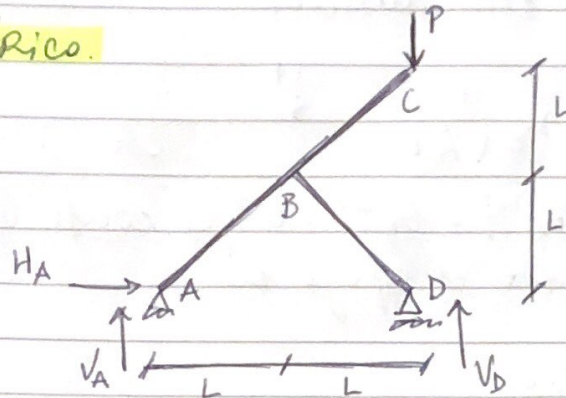


EXAMEN RESISTENCIA DE MATERIALES I

Febrero 2021.

TEÓRICO.

a)



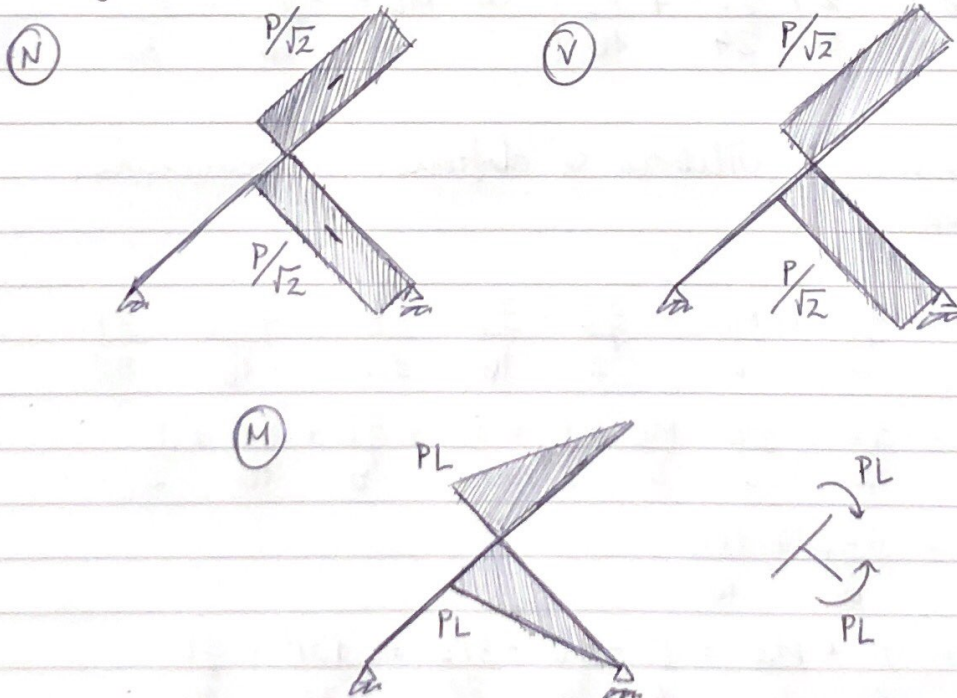
Equilibrio

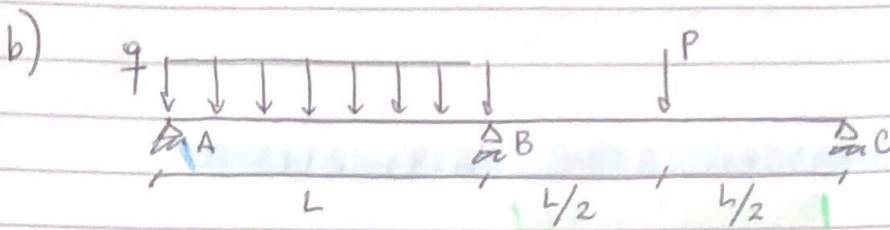
$$\rightarrow \sum H = 0 \Rightarrow H_A = 0$$

$$\rightarrow \sum \tau = 0 \Rightarrow P \cdot 2L - V_D \cdot 2L = 0 \Rightarrow V_D = P$$

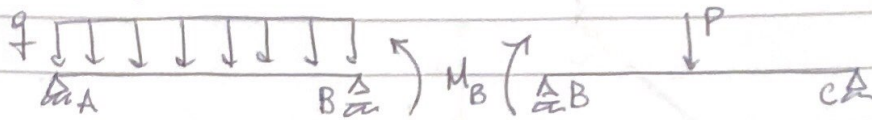
$$\rightarrow \sum V = 0 \Rightarrow V_A + V_D = P \Rightarrow V_A = 0$$

Diagramas.





→ Trabajo con la estructura auxiliar.



→ Se debe imponer $\theta_B^{izq} + \theta_B^{der} = 0$ por continuidad de la estructura sobre el apoyo B.

$$\rightarrow \theta_B^{izq} = \frac{qL^3}{24EI} + \frac{MBL}{3EI}$$

$$\rightarrow \theta_B^{der} = \frac{MBL}{3EI} + \frac{PL^2}{16EI}$$

$$\Rightarrow \frac{qL^3}{24EI} + \frac{MBL}{3EI} + \frac{MBL}{3EI} + \frac{PL^2}{16EI} = 0$$

$$\rightarrow \frac{qL^2}{24} + \frac{2MB}{3} + \frac{PL}{16} = 0$$

$$\Rightarrow MB = -\frac{3}{2} \left(\frac{qL^2}{24} + \frac{PL}{16} \right) \rightarrow MB = -\frac{qL^2}{16} - \frac{3PL}{32}$$

→ Realizando equilibrio se obtienen las reacciones V_A , V_B y V_C .

$$\Rightarrow V_A = \frac{qL}{2} + \frac{MB}{L} = \frac{qL}{2} - \frac{qL}{16} - \frac{3P}{32} = \frac{7qL}{16} - \frac{3P}{32}$$

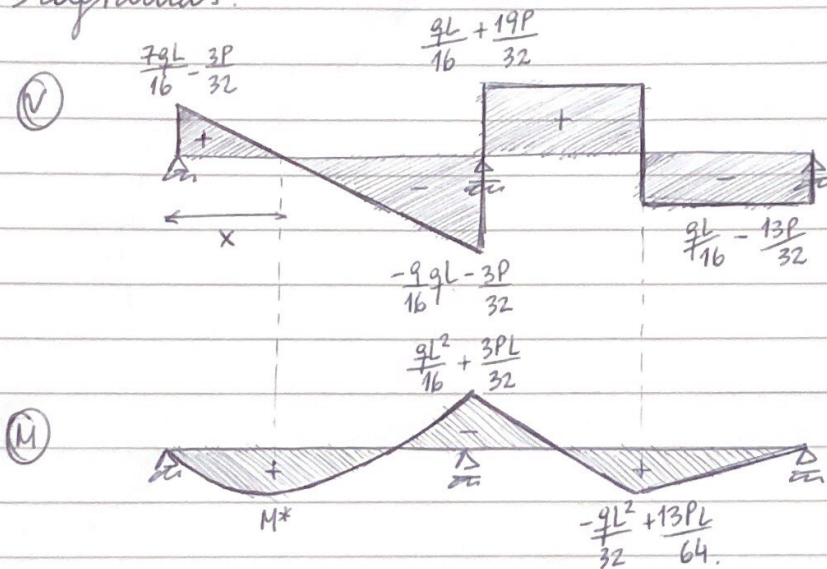
$$\Rightarrow V_B = \frac{qL}{2} - \frac{MB}{L} - \frac{MB}{L} + \frac{P}{2} = \frac{qL}{2} + \frac{qL}{8} + \frac{3P}{16} + \frac{P}{2}$$

$$V_B = \frac{5qL}{8} + \frac{11P}{16}$$

$$\Rightarrow V_C = \frac{P}{2} + \frac{MB}{L} = \frac{P}{2} - \frac{qL}{16} - \frac{3P}{32} = \frac{13P}{32} - \frac{qL}{16}$$

* Se asume para trazar los diagramas que P y f guardan una relación tal que $V_A > 0$ y $V_C > 0$.

→ Diagramas.



$$* \quad q x = \frac{7qL}{16} - \frac{3P}{32} \Rightarrow x = \frac{7L}{16} - \frac{3P}{32q}$$

$$* \quad M^* = \left(\frac{7qL}{16} - \frac{3P}{32} \right) \frac{x}{2}$$