UDS

Licenciatura en Arquitectura

Nombre del alumno:

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Materia:

Resistencia de materiales de construcción

Nombre del profesor:

Arq. Pedro Alberto García López

Cuatrimestre:

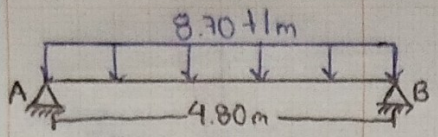
Cuarto

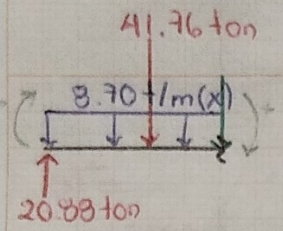
Nombre de la actividad:

Unidad III: Centroides y momentos de inercia (Ejercicios)

Fecha: 12 de noviembre de 2023

Ejercicio 1:





① qL

$(8.70\ t/m)(4.80\ m) = 41.76\ ton$

② $RA = RB = \frac{qL}{2} \rightarrow$

$\frac{(8.70\ t/m)(4.80\ m)}{2} = 20.88\ ton$

③ Ecuación de cortante

$\Sigma F_Y = 0$

$20.88\ ton - 8.70\ t/m\ (x) - V = 0$

$V = 20.88\ ton - [8.70\ t/m\ (x)]$

④ Ecuación de momentos

$\Sigma M = 0$

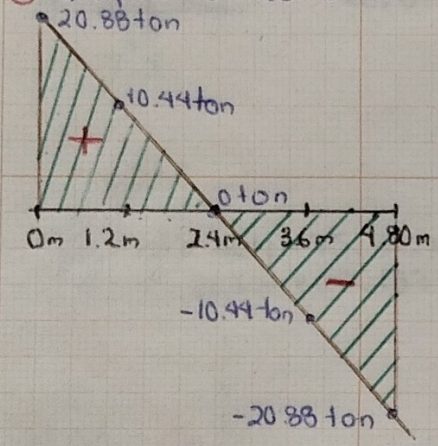
$-20.88\ ton\ (x) + [8.70\ t/m\ (x)(x/2)] + M = 0$

$-20.88\ ton\ (x) + \frac{[8.70\ t/m\ (x^2)]}{2} + M = 0$

$-20.88\ ton\ (x) + 4.35\ t/m\ (x^2) + M = 0$

$M = 20.88\ ton\ (x) - 4.35\ t/m\ (x^2)$

⑤ Gráfica de cortante



X	0m	1.2m	2.4m	3.6m	4.8m
V					

$V = 20.88\ ton - [8.70\ t/m\ (0)] = 20.88\ ton$

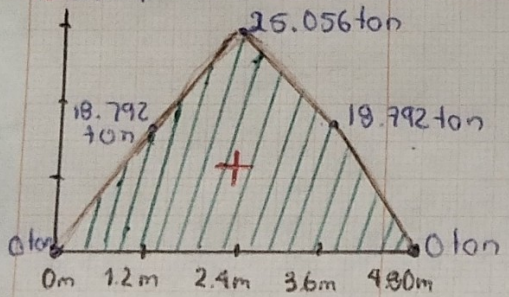
$V = 20.88\ ton - [8.70\ t/m\ (1.2m)] = 10.44\ ton$

$V = 20.88\ ton - [8.70\ t/m\ (2.4m)] = 0$

$V = 20.88\ ton - [8.70\ t/m\ (3.6m)] = 10.44\ ton$

$V = 20.88\ ton - [8.70\ t/m\ (4.8m)] = -20.88\ ton$

⑥ Grafica de momentos



X	0m	1.2m	2.4m	3.6m	4.8m
M	0 ton	18.792 ton	25.056 ton	18.792 ton	0 ton

$M = 20.88\ ton\ (0) - 4.35\ t/m\ (0)^2 = 0\ ton$

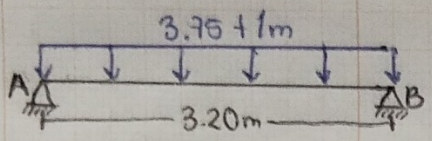
$M = 20.88\ ton\ (1.2) - 4.35\ t/m\ (1.2)^2 = 18.792\ ton$

$M = 20.88\ ton\ (2.4) - 4.35\ t/m\ (2.4)^2 = 25.056\ ton$

$M = 20.88\ ton\ (3.6) - 4.35\ t/m\ (3.6)^2 = 18.792\ ton$

$M = 20.88\ ton\ (4.8) - 4.35\ t/m\ (4.8)^2 = 0\ ton$

Ejercicio 2:

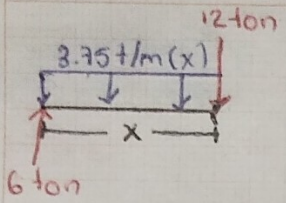


① qL

$(3.75\ t/m)(3.20\ m) = 12\ ton$

② $RA = RB = \frac{qL}{2}$

$\frac{(3.75\ t/m)(3.20\ m)}{2} = 6\ ton$



③ Ecuacion de cortante

$\Sigma F_y = 0$

$6\ ton - 3.75\ t/m\ (x) - V = 0$

$V = 6\ ton - [3.75\ t/m\ (x)]$

④ Ecuacion de momentos

$\Sigma M = 0$

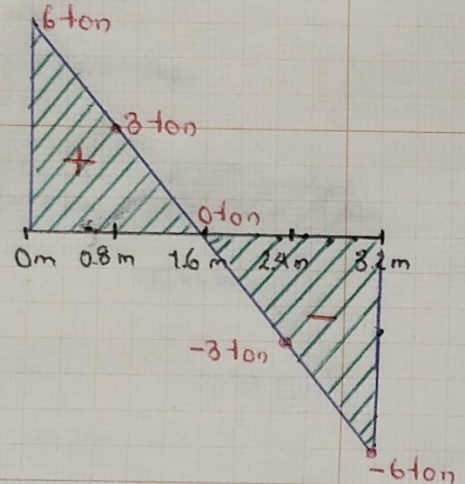
$-6\ ton\ (x) + [3.75\ t/m\ (x)(x/2)] + M = 0$

$-6\ ton\ (x) + \frac{[3.75\ t/m\ (x^2)]}{2} + M = 0$

$-6\ ton\ (x) + 1.875\ t/m\ (x^2) + M = 0$

$M = 6\ ton\ (x) - 1.875\ t/m\ (x^2)$

⑥ Gráfica de cortante



X	0m	0.8m	1.6m	2.4m	3.2m
V	6 ton	3 ton	0 ton	-3 ton	-6 ton

$V = 6\ ton - [3.75\ t/m\ (0)] = 6\ ton$

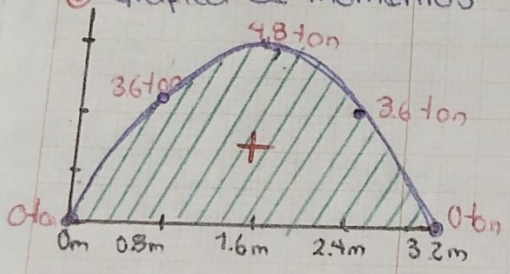
$V = 6\ ton - [3.75\ t/m\ (0.8)] = 3\ ton$

$V = 6\ ton - [3.75\ t/m\ (1.6m)] = 0$

$V = 6\ ton - [3.75\ t/m\ (2.4m)] = -3\ ton$

$V = 6\ ton - [3.75\ t/m\ (3.2m)] = -6\ ton$

⑥ Gráfica de momentos



X	0m	0.8m	1.6m	2.4m	3.2m
M	0 ton	3.6 ton	4.8 ton	3.6 ton	0 ton

$M = 6\ ton\ (0m) - 1.875\ t/m\ (0)^2 = 0\ ton$

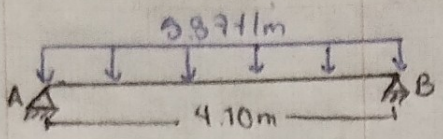
$M = 6\ ton\ (0.8m) - 1.875\ t/m\ (0.8)^2 = 3.6\ ton$

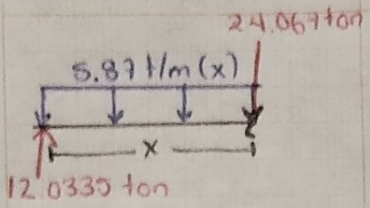
$M = 6\ ton\ (1.6m) - 1.875\ t/m\ (1.6m)^2 = 4.8\ ton$

$M = 6\ ton\ (2.4m) - 1.875\ t/m\ (2.4m)^2 = 3.6\ ton$

$M = 6\ ton\ (3.2m) - 1.875\ t/m\ (3.2m)^2 = 0\ ton$

Ejercicio 3





① $qL = 5.87\ t/m\ (4.10\ m) = 24.067\ ton$

② $RA = RB = \frac{qL}{2}$

$\frac{5.87\ t/m\ (4.10\ m)}{2} = 12.0335\ ton$

⑤ Ecuación de cortante

$\Sigma Fy = 0$

$12.0335\ ton - [5.87\ t/m\ (x)] - V = 0$

$V = 12.0335\ ton - [5.87\ t/m\ (x)]$

④ Ecuación de momento

$\Sigma M = 0$

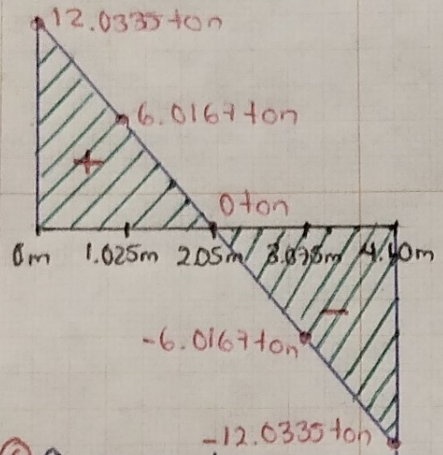
$-12.0335\ (x) + [5.87\ t/m\ (x)(x/2)] + M = 0$

$-12.0335\ (x) + [\frac{5.87\ t/m\ (x^2)}{2}] + M = 0$

$-12.0335\ (x) + 2.935\ t/m\ (x^2) + M = 0$

$M = 12.0335\ (x) - 2.935\ t/m\ (x^2)$

⑤ Grafica de cortante



X	0m	1.025m	2.05m	3.075m	4.1 m
V	12.0335 ton	6.0167 ton	0 ton	-6.0167 ton	-12.0335 ton

$V = 12.033\ ton - [5.87\ t/m\ (0\ m)] = 12.0335\ ton$

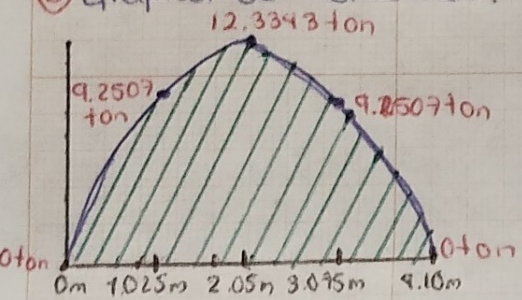
$V = 12.033\ ton - [5.87\ t/m\ (1.025\ m)] = 6.0167\ ton$

$V = 12.033\ ton - [5.87\ t/m\ (2.05\ m)] = 0\ ton$

$V = 12.033\ ton - [5.87\ t/m\ (3.075\ m)] = -6.0167\ ton$

$V = 12.033\ ton - [5.87\ t/m\ (4.1\ m)] = -12.0335\ ton$

⑥ Gráfica de momentos.



X	0m	1.025m	2.05m	3.075m	4.10m
M	0 ton	9.2507 ton	12.3343 ton	9.2507 ton	0 ton

$M = 12.0335\ ton\ (0) - 2.935\ t/m\ (0^2) = 0\ ton$

$M = 12.0335\ ton\ (1.025\ m) - 2.935\ t/m\ (1.025\ m)^2 = 9.2507$

$M = 12.0335\ ton\ (2.05\ m) - 2.935\ t/m\ (2.05\ m) = 12.3343\ ton$

$M = 12.0335\ ton\ (3.075\ m) - 2.935\ t/m\ (3.075\ m) = 9.2507\ ton$

$M = 12.0335\ ton\ (4.10\ m) - 2.935\ t/m\ (4.10\ m) = 0\ ton$