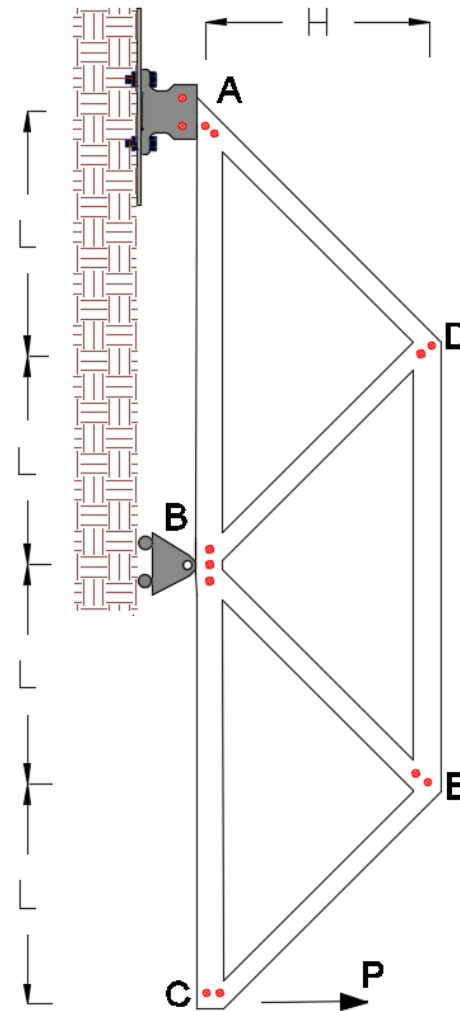


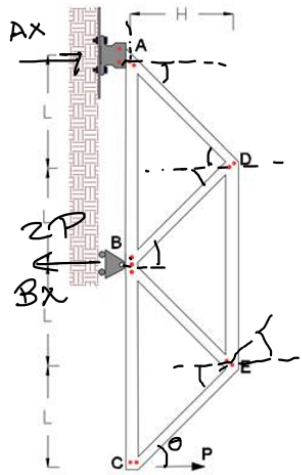
Nº USP: \_\_\_\_\_ Nome: \_\_\_\_\_

**3ª Questão (3 pts):** Para a treliça da figura, considere  $H = 5000$  mm e  $L = 4000$  mm. Sabendo-se que em todas as barras não se pode ultrapassar os valores de 400 kN à tração e 350 kN à compressão. Obtenha os esforços em todas as barras em termos de  $P$  e em seguida obtenha o maior valor possível para a força  $P$  na direção e sentido indicado. Indique a resposta na tabela.

Resposta:

$N_{AB}$	$0,8.P$
$N_{AD}$	$-P/(\cos 38) = -1,281.P$
$N_{BD}$	$P/(\cos 38) = 1,281.P$
$N_{BE}$	$P/(\cos 38) = 1,281.P$
$N_{DE}$	$-1,6.P$
$N_{BC}$	$0,8.P$
$N_{EC}$	$-P/(\cos 38) = -1,281.P$
$P_{\max}$	$218,75$ kN





$$\theta = 38,66^\circ$$

$$\sin \theta = 0,6247 \quad \cos \theta = 0,78067$$

$$\sum F_x = 0$$

$$P + N_{CE} \cos \theta = 0$$

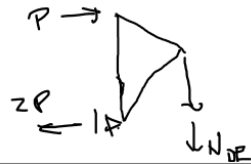
$$N_{CE} = -1,2806P = -\frac{P}{\cos \theta}$$

$$\sum F_y = 0$$

$$N_{BC} \sin \theta + N_{BC} = 0$$

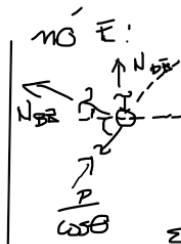
$$N_{BC} = 1,2806P \cdot 0,6247$$

$$N_{BC} = 0,8P$$



$$\sum M_B:$$

$$m.o.i$$



$$\sum F_x = 0$$

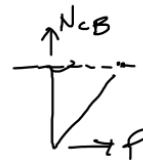
$$N_{BE} \cos \theta = \frac{P}{\cos \theta}$$

$$N_{BE} = \frac{P}{\cos^2 \theta} = 1,2806P$$

$$\sum F_y = 0:$$

$$N_{DE} + \frac{P}{\cos \theta} \sin \theta + \frac{P}{\cos \theta} \sin \theta = 0$$

$$N_{DE} = -1,6P$$



$$N_{CB} \cdot H = P \cdot L \Rightarrow N_{CB} = P \cdot 0,8$$

Resposta:

<u>N<sub>AB</sub></u>	0,8P
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Resposta:

<u>N<sub>AB</sub></u>	0,8P
<u>N<sub>AD</sub></u>	$-\frac{P}{\cos \theta} = -1,2806P$
<u>N<sub>BD</sub></u>	$P/\cos \theta$
<u>N<sub>BE</sub></u>	1,2806P
<u>N<sub>DE</sub></u>	-1,6P
<u>N<sub>BC</sub></u>	0,8P
<u>N<sub>EC</sub></u>	$-\frac{P}{\cos \theta} = -1,2806P$
<u>P<sub>max</sub></u>	213,75KN



$$\sum M_B = 0$$

$$N_{DE} \cdot H + P \cdot 2L = 0$$

$$N_{DE} = -\frac{24P}{5} = -\frac{8}{5}P$$

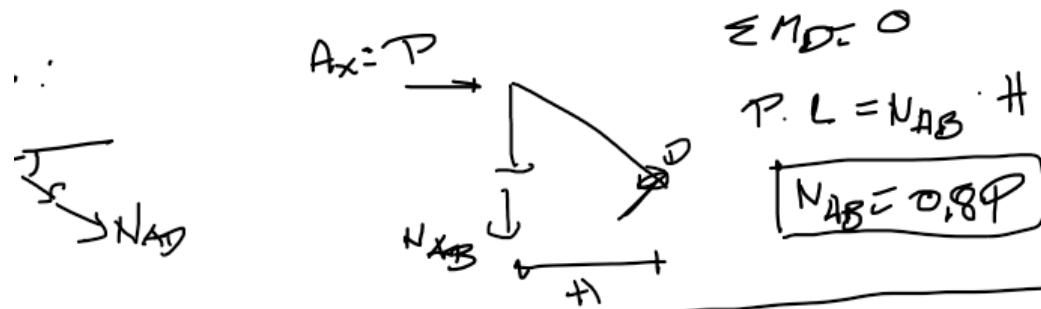


$$\sum F_x = 0$$

$$P_{T_{max}} = 1,2805P$$

$$P_{C_{max}} = -1,6P$$

$$\circ: A_x \cdot 2L = P \cdot 2L \Rightarrow \boxed{A_x = P}$$



AB  
 $\circ: N_{AD} \cdot \cos 45 = -P \Rightarrow \boxed{N_{AD} = \frac{-P}{\cos 45} = -1,2806P}$

$$1,2806P \leq 400$$

$$P \leq 312,38$$

$$|-1,6P| \leq 350$$

$$P \leq 218,75$$

$$\therefore P_{\max} = 218,75 \text{ kN}$$

NBDW

$N_{PD} =$