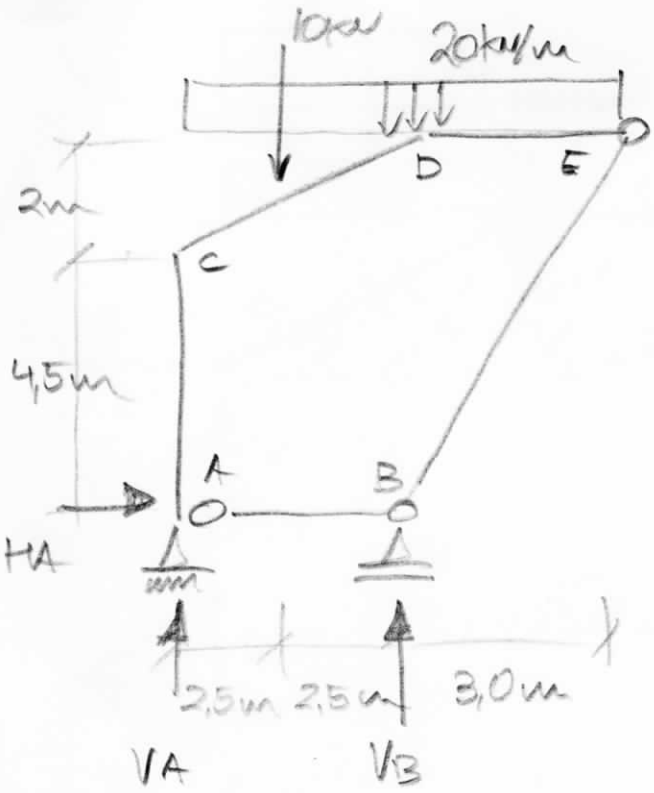
TE1-6a.3



(a) RÀS

$\Sigma_A = 0 \circlearrowright^{\oplus}$

$10 \times 2{,}5 + 20 \times (8)^2/2 - V_B \times 5 = 0$

$25 + 10 \times 64 = V_B \times 5$

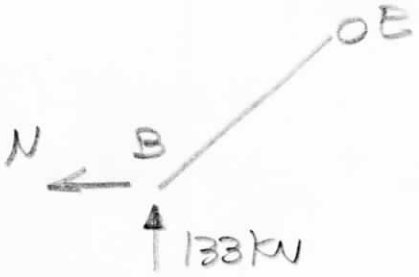
$V_B = \frac{1}{5}(25 + 640) = \underline{133\,kN} \uparrow$

$\Sigma F_V = 0 \uparrow^{\oplus}$

$V_A - 10 - 20 \times 8 + 133 = 0$

$V_A = 10 + 160 - 133 = \underline{37\,kN} \uparrow$

$\Sigma M_E^{DIR} = 0 \circlearrowright^{\oplus}$

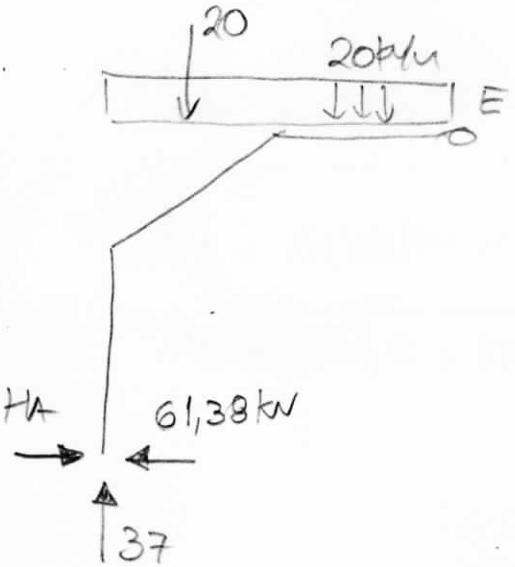


$\boxed{\text{ESCORA}}$

$133\,kN \times 3\,m + N \times 6{,}5\,m = 0$

$N = -133 \times 3/6{,}5 = \underline{-61{,}38\,kN}$

$\Sigma M_E^{ESQ} = 0 \circlearrowleft^{\oplus}$



$H_A \times 6{,}5 + 10 \times 5{,}5 + 20 \times 8^2/2$

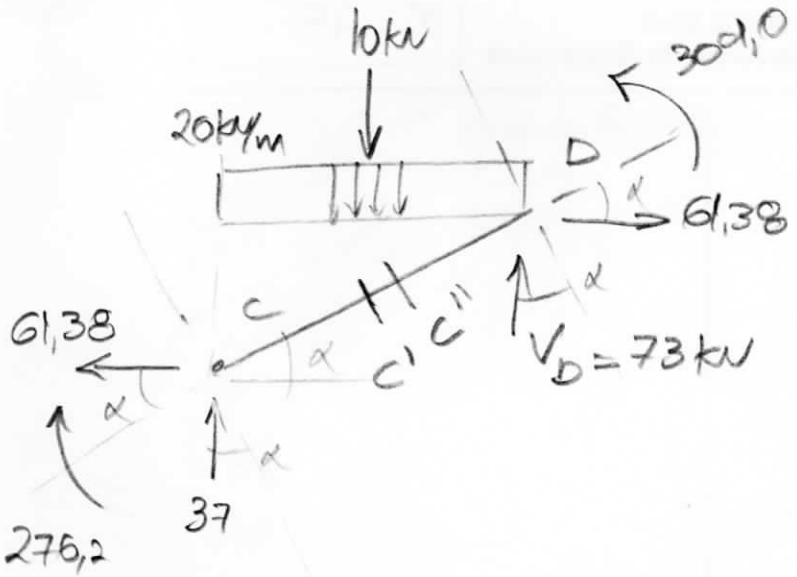
$- 61{,}38 \times 6{,}5 - 37 \times 8 = 0$

$H_A \times 6{,}5 + 55 + 640 - 398{,}97 - 296$

$H_A \times 6{,}5 + 695 - 694{,}97 = 0$

$H_A = \frac{1}{6{,}5}\, 0{,}03 = 0{,}004 \simeq \boxed{0}$

EQUILÍBRIO DE CD:

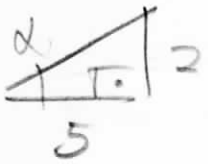


$\Sigma F_V = 0 \uparrow \oplus$

$37 - 10 - 20 \times 5 + V_D = 0$

$V_D = -37 + 10 + 100$

$V_D = 73\ kN$



$h = \sqrt{2^2+5^2} = \sqrt{29}$ $\quad \cos\alpha = 5/\sqrt{29}$

$\operatorname{sen}\alpha = 2/\sqrt{29}$

$q_{\perp} = 20\ kN/m \cdot \cos^2\alpha = 20 \times 25/29 = \underline{17,24\ kN/m}$

$C_{\perp} = 61,38 \times \operatorname{sen}\alpha + 37 \cos\alpha$

$61,38 \times 2/\sqrt{29} + 37 \times 5/\sqrt{29} = \underline{57,15\ kN}$

$D_{\perp} = 61,38 \times \operatorname{sen}\alpha - 73 \cos\alpha$

$61,38 \times 2/\sqrt{29} - 73 \times 5/\sqrt{29} = \underline{-44,98\ kN}$

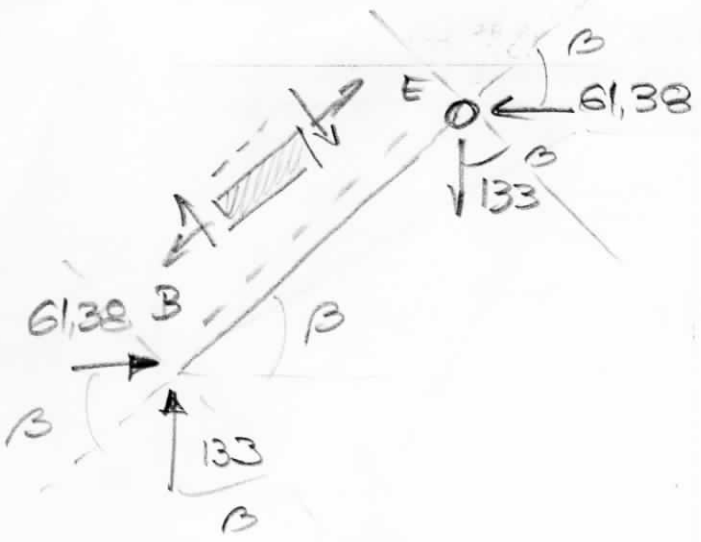
$C'_{\perp} = 57,15\ kN - 17,24 \times \sqrt{29}/2 = \underline{+10,73\ kN}$

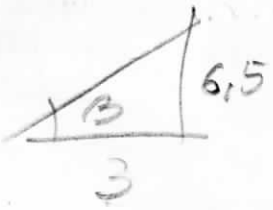
$C''_{\perp} = +10,73\ kN - 10 \times 5/\sqrt{29} = \underline{+1,445\ kN}$

$M_C = 61,38\ kN \times 4,5\ m = 276,2\ kN.m$

$M_D = 276,2 + 37 \times 5 + 61,38 \times 2 - 10 \times 2,9 - 20 \times 5^2/2 = \underline{309,0\ kN.m}$

Equilíbrio de BE:





$h = \sqrt{6{,}5^2 + 3^2} = 7{,}159$

$\cos\beta = 3/7{,}159 = 0{,}4191$

$\text{sen}\,\beta = 6{,}5/7{,}159 = 0{,}9079$

$B_{\perp} = -61{,}38\,\text{sen}\,\beta + 133\cos\beta$

$= -61{,}38 \times 0{,}9079 + 133 \times 0{,}4191 = 0{,}0133$

$B_{//} = -61{,}38\cos\beta - 133\,\text{sen}\,\beta$

$-61{,}38 \times 0{,}4191 - 133 \times 0{,}9079 = -146{,}48\ kN$

COMO NÃO HÁ CARGAS NA BARRA

$E_{\perp} = B_{\perp} = 0$

$E_{//} = B_{//} = -146{,}48$