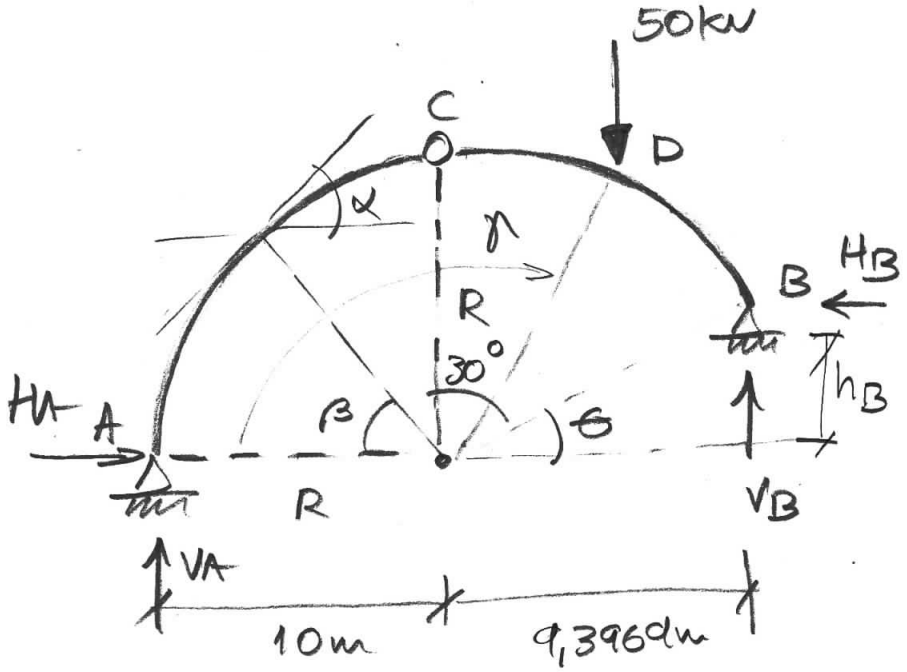
TE1-7.7



$R\cos\theta = 9{,}3969$

$\theta = \arccos \frac{9{,}3969}{10}$

$\theta = 20°$

$\alpha = \frac{\pi}{2} - \beta$ (rad)

$\alpha = 90° - \beta$ (graus)

$h_B = 10m \times \operatorname{sen} 20° = 3{,}4202m$

$\curvearrowleft \Sigma M_C = 0 \quad V_A \times 10 - H_A \times 10 = 0$

$\curvearrowleft \Sigma M_B = 0 \quad V_A \times 19{,}3969 - H_A \times 3{,}4202 - 50(9{,}3969 - 10 \times \operatorname{sen} 30°)$

$$\begin{cases} 10V_A - 10H_A = 0 \\ 19{,}3969V_A - 3{,}4202H_A = 219{,}845 \end{cases}$$

$V_A = 13{,}76\,kN \uparrow$

$H_A = 13{,}76\,kN \rightarrow$

$x = R(1-\cos\beta) \qquad \beta = 120° \times \frac{\pi}{180°} = \frac{2\pi}{3}$

$y = R\operatorname{sen}\beta$

$M_{AD}(\beta) = V_A R(1-\cos\beta) - H_A R\operatorname{sen}\beta$

$M_{AD}(\beta) = 13{,}76 \times 10\,(1-\cos\beta) - 13{,}76 \times 10\operatorname{sen}\beta$

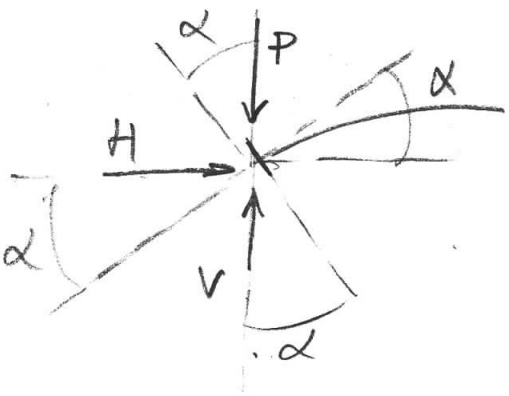
$\underline{M_{AD}(\beta) = 137{,}6\,(1-\cos\beta-\operatorname{sen}\beta)}$

$M_{DB}(\beta) = 137{,}6\,(1-\cos\beta-\operatorname{sen}\beta) - 50 \times [10(1-\cos\beta) - 10(1-\cos\beta)]$

$$M_{DB}(\beta) = 137{,}6\,(1-\cos\beta-\operatorname{sen}\beta) - 500\left(-\cos\beta+\cos\gamma\right)$$

$$\cos\frac{2\pi}{3} = -0{,}5$$

$$M_{DB}(\beta) = 137{,}6\,(1-\cos\beta-\operatorname{sen}\beta) + 500\cos\beta + 250$$



$$Q_{AD}(\beta) = 13{,}76\cos(\alpha) - 13{,}76\operatorname{sen}(\alpha)$$

$$Q_{AD}(\beta) = 13{,}76\cos(90^\circ-\beta) - 13{,}76\operatorname{sen}(90^\circ-\beta)$$

$$Q_{DB}(\beta) = (13{,}76-50)\cos(90^\circ-\beta) - 13{,}76\operatorname{sen}(90^\circ-\beta)$$

$$Q_{DB}(\beta) = -36{,}24\cos(90^\circ-\beta) - 13{,}76\operatorname{sen}(90^\circ-\beta)$$

$$N_{AD}(\beta) = -13{,}76\operatorname{sen}(90^\circ-\beta) - 13{,}76\cos(90^\circ-\beta)$$

$$N_{DB}(\beta) = (-13{,}76+50)\operatorname{sen}(90^\circ-\beta) - 13{,}76\cos(90^\circ-\beta)$$

$$N_{DB}(\beta) = 36{,}24\operatorname{sen}(90^\circ-\beta) - 13{,}76\cos(90^\circ-\beta)$$

β	M [kNm]	Q [kN]	N [kN]
0°	0	-13,760	-13,760
30°	-50,365	-5,0365	-18,797
60°	-50,365	+5,0365	-18,797
90°	0	+13,760	-13,760
120°	+87,235	+18,797/-24,505	-5,0365/-30,037
150°	+4,9524	-6,2035	-38,265
160°	0	+0,53536	-38,761