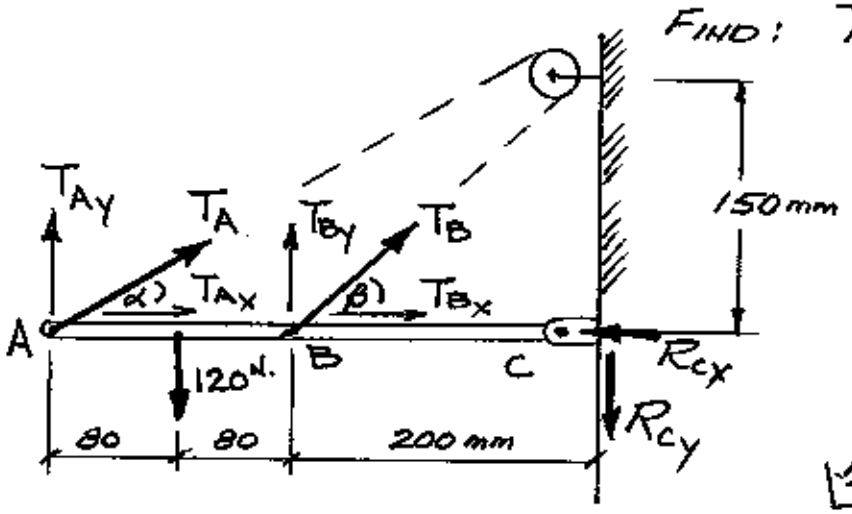
4.30 p. 171

MILANO

NEGLECT FRICTION
∴ CABLE TENSION IS SAME THROUGHOUT

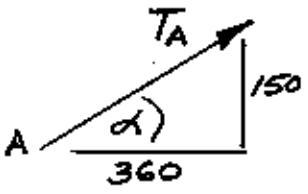
ANALYZE FORCES ON BEAM ABC

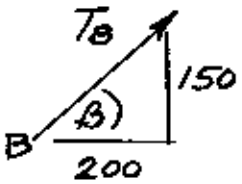
FIND: T_{ADB}, R_C ?



ASSUME DIR. FOR REACTIONS AT C.

NEED GEOMETRY FOR ANGLES TO GET COMPONENTS FOR T_A and T_B





(+)

$$\Sigma F_y = 0 = T_{A_Y} + T_{B_Y} - 120^N - R_{C_Y}$$

$$\Sigma F_x = 0 = T_{A_X} + T_{B_X} - R_{C_X}$$

$\alpha = \tan^{-1}\frac{150}{360}$ $\beta = \tan^{-1}\frac{150}{200}$

$\alpha = 22.62°$ $\beta = 36.87°$

USE THE PINNED END AS THE PIVOT FOR MOMENTS.

$$\Sigma M_C = 0 = -T_{A_Y}(360\text{ mm}) - T_{B_Y}(200\text{ mm}) + 120^N(280\text{ mm})$$
$$- T_A \sin 22.62°(360) - T_B \sin 36.87°(200) = -120(280)$$

SINCE CABLE TENSION IS SAME THROUGHOUT, $T_A = T_B = T$

$$138.46\,T + 120\,T = 33.6 \times 10^3$$

$$\therefore \boxed{T = 130^N.}$$

BACK SUB. INTO $\Sigma F_y = 0$ and $\Sigma F_x = 0$

$$R_{C_X} = T_{A_X} + T_{B_X} = 130^N \cos 22.62° + 130^N \cos 36.87° = 224^N. \leftarrow$$

$$R_{C_Y} = T_{A_Y} + T_{B_Y} - 120^N = 130^N[\sin 22.62° + \sin 36.87°] - 120$$
$$= 8^N \downarrow$$

$$R_C = \sqrt{R_{C_X}^2 + R_{C_Y}^2} = 224.14^N$$

$$\theta = \tan^{-1}\frac{-8}{-224} = 2° + 180°$$

$$\boxed{R_C = 224.14^N \measuredangle 2° \text{ or } \measuredangle 182°}$$