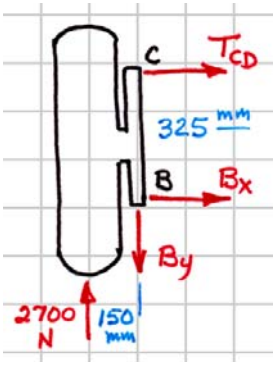
1-28

From a free body diagram of the wheel and arm *BC*



$$\rightarrow \Sigma F_x = 0: \qquad T_{CD} + B_x = 0$$

$$\uparrow \Sigma F_y = 0: \qquad 2700 - B_y = 0$$

$$\circlearrowleft \Sigma M_B = 0: \qquad -150(2700) - 325T_{CD} = 0$$

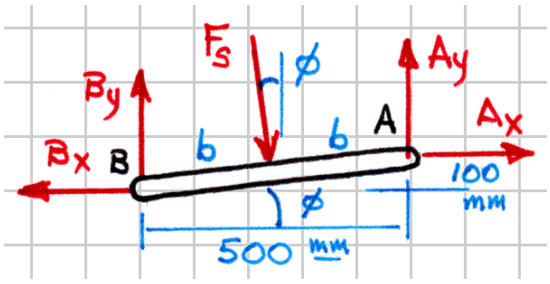
$$B_x = 1246 \text{ N} \qquad B_y = 2700 \text{ N}$$

B = 2970 N ◺ 65.2° (on *AB*) ..... **Ans.**

$T_{CD} = -1246.154 \text{ N} \cong 1246 \text{ N (C)}$ ..... **Ans.**

Then from a free-body diagram of the arm *AB* (and assuming that the spring pushes perpendicularly against the arm)

$$\circlearrowleft \Sigma M_A = 0: \qquad -100(1246.154) - 500(2700) + bF_S = 0$$



$$\rightarrow \Sigma F_x = 0: \qquad A_x - 1246.154 + F_S \sin\phi = 0$$

$$\uparrow \Sigma F_y = 0: \qquad 2700 - F_S \cos\phi + A_y = 0$$

$$\phi = \tan^{-1}\frac{50}{250} = 11.310°$$

$$b = \sqrt{50^2 + 250^2} = 254.951 \text{ mm}$$

$F_S = 5783.92 \text{ N} \cong 5780 \text{ N (C)}$ ..... **Ans.**

$A_x = 111.827 \text{ N} \qquad A_y = 2971.60 \text{ N}$

A = 2970 N ◿ 87.8° ..... **Ans.**