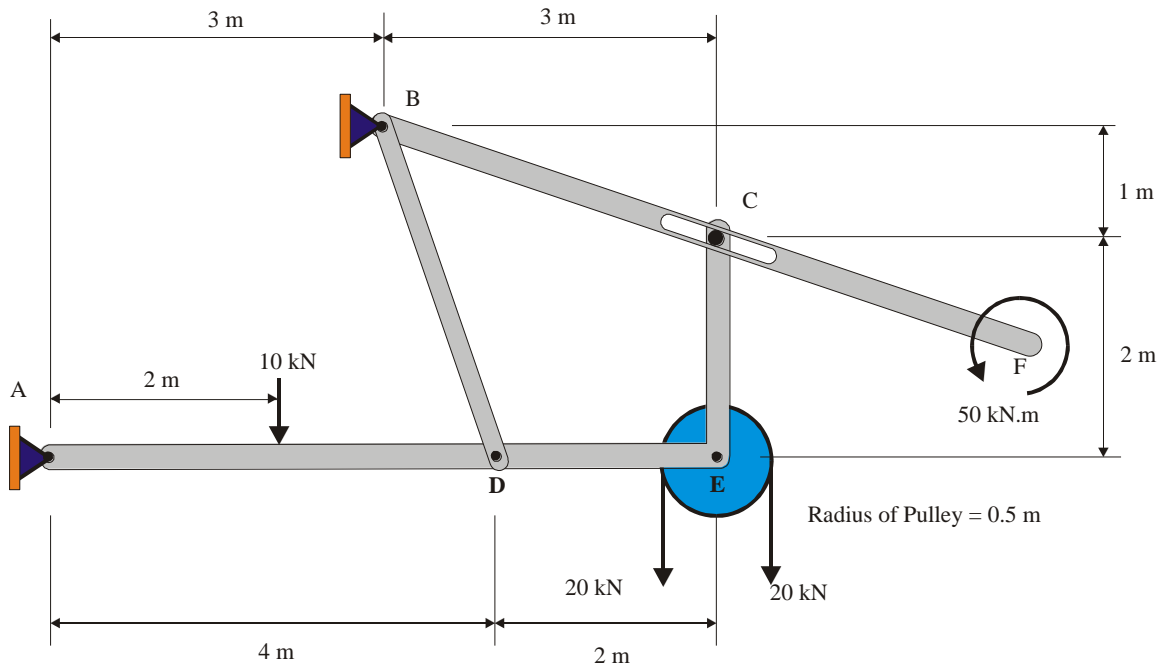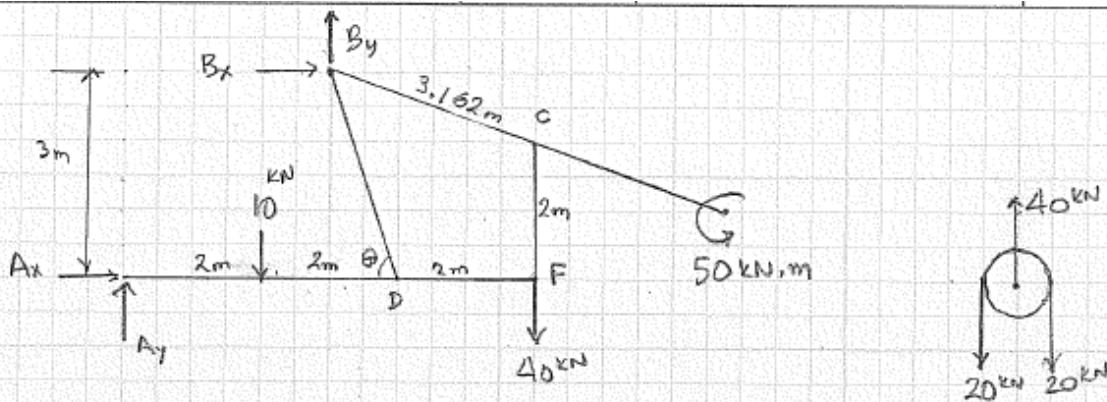The frame shown has three members (*Bent Member ADEC, Member BD and Member BCF*). A smooth pulley having a radius of *0.5 m* is attached to the bent member at *E*. Member *BCF* has a slot at C and a *50 kN.m* counterclockwise couple moment applied at *F*. The frame has pin supports at *A* and *B*.

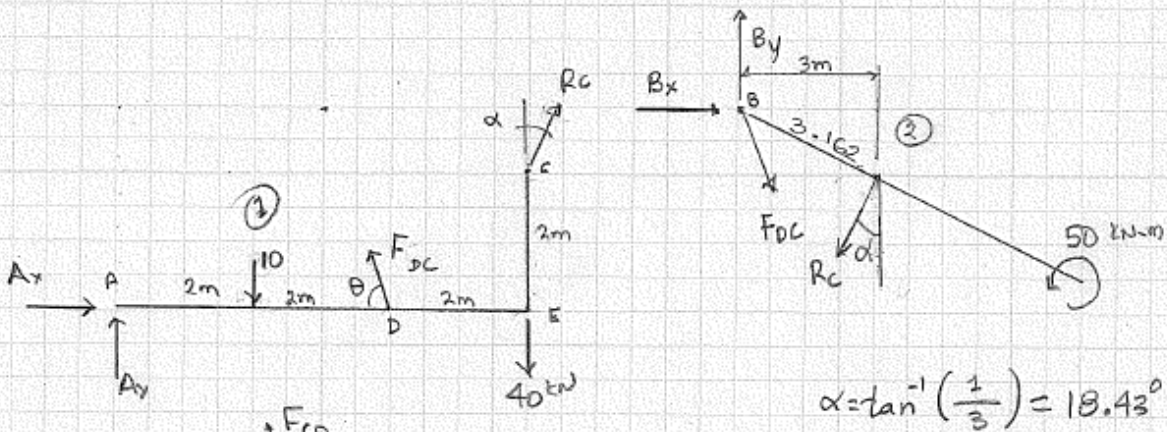Determine the forces exerted by the pins on each member of the frame and on the pulley.

$(\Sigma F_x = 0)$  $A_x + B_x = 0$  ①

$(\Sigma F_y = 0)$  $A_y + B_y - 40 - 10 = 0$  $A_y + B_y = 50$  ②

$(\Sigma M_A = 0) \circlearrowleft)$  $-3B_x + 3B_y - 6(40) + 50 - 2(10) = 0$

$-3B_x + 3B_y = 210$  ③

$\alpha = \tan^{-1}\left(\frac{1}{3}\right) = 18.43°$

$\theta = \tan^{-1}\left(\frac{3}{1}\right) = 71.56°$

From FBD2 $(\Sigma M_B = 0)$   $-3.162 R_c + 50 = 0$   $\boxed{R_c = 15.81 \text{ kN}}$

From FBD1 $(\Sigma M_D = 0)$   $-4A_y - 2(40) + 2R_c \cos\alpha - 2R_c \sin\alpha + 2(10) = 0$

$$-4A_y - 80 + 2(15.81)\cos 18.43° - 2(15.81)\sin 18.43° + 20 = 0$$

$$\boxed{A_y = -10.0 \text{ kN}}$$

From Eq ②   $-10.0 + B_y = 50$      $\boxed{B_y = 60.0 \text{ kN}}$

From Eq ③   $-3B_x + 3(60.0) = 210$   $B_x = +10.0 \text{ kN}$

From ①      $\boxed{A_x = -B_x = 10.0 \text{ kN}}$

From FBD1 $(\Sigma F_y = 0)$   $A_y + F_{DC}\sin\theta - 40 + R_c \cos 18.43 - 10 = 0$

$$-10.0 + F_{DC}\sin 71.56 - 40 + 15.81 \cos 18.43 - 10 = 0$$

$$\boxed{F_{DC} = 47.44 \text{ kN}}$$