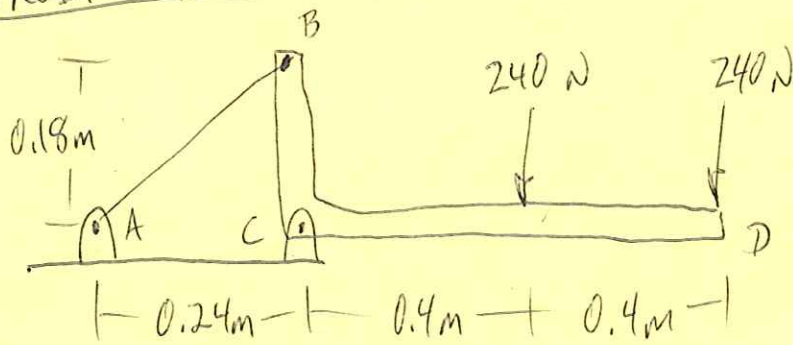
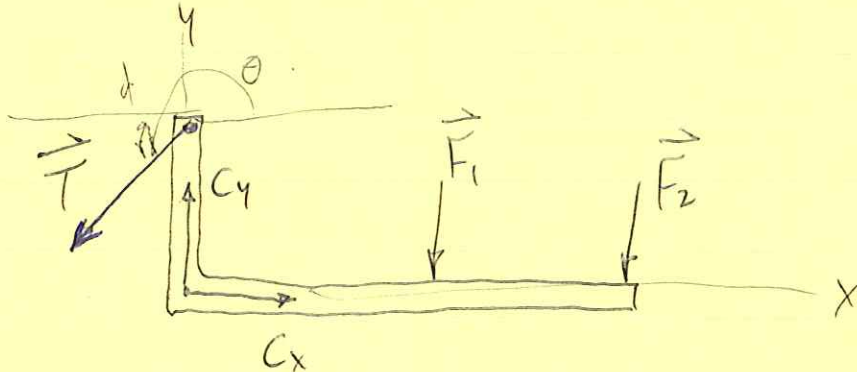


PROB. 4.15



FIND TENSION, REACTION AT C.

FREE-BODY DIAGRAM:



FIND POSITION VECTORS:

$$\vec{r}_T = (0.18) \hat{j} \text{ m}$$

$$\vec{r}_{F_1} = (0.4) \hat{i} \text{ m}$$

$$\vec{r}_{F_2} = (0.8) \hat{i} \text{ m}$$

FIND VECTORS:

$$\phi = \text{TAN}^{-1} \left(\frac{0.18}{0.24} \right) = 36.9^\circ$$

PROB. 4.15

$$\theta = 180^\circ + \phi = 217^\circ$$

$$\vec{T} = (T \cos 217^\circ) \hat{i} + (T \sin 217^\circ) \hat{j} \text{ N}$$

$$\vec{T} = (-0.799T) \hat{i} + (-0.602T) \hat{j} \text{ N}$$

$$\vec{F}_1 = (-240) \hat{j} \text{ N}$$

$$\vec{F}_2 = (-240) \hat{j} \text{ N}$$

$$\sum M_c = 0$$

$$\vec{r}_T \times \vec{T} + \vec{r}_{F_1} \times \vec{F}_1 + \vec{r}_{F_2} \times \vec{F}_2 = 0$$

$$\vec{M}_1 = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 0.18 & 0 \\ -0.799T & -0.602T & 0 \end{vmatrix}$$

$$\vec{M}_1 = (0) \hat{i} + (0) \hat{j} + [(0)(-0.602T) - (0.18)(-0.799T)] \hat{k}$$

$$\vec{M}_1 = (0.144T) \hat{k} \text{ N-m}$$

$$\vec{M}_2 = \vec{r}_{F_1} \times \vec{F}_1 = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0.4 & 0 & 0 \\ 0 & -240 & 0 \end{vmatrix}$$

$$\vec{M}_2 = (-96) \hat{k} \text{ N-m}$$

PROB. 4.15 CONT.

$$\vec{M}_3 = \vec{r}_{F_2} \times \vec{F}_2 = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0.8 & 0 & 0 \\ 0 & -240 & 0 \end{vmatrix}$$

$$\vec{M}_3 = (-192) \hat{k} \text{ N-m}$$

$$(0.144 T) + (-96) + (-192) = 0$$

$$T = 2000 \text{ N}$$

$$\Sigma F_x = 0$$

$$(-0.799 T) + C_x = 0$$

$$C_x = 0.799(2000) = 1600 \text{ N}$$

$$\Sigma F_y = 0$$

$$(-0.602 T) + C_y + (-240) + (-240) = 0$$

$$C_y = 1680 \text{ N}$$

$$\vec{C} = (1600) \hat{i} + (1680) \hat{j} \text{ N}$$

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