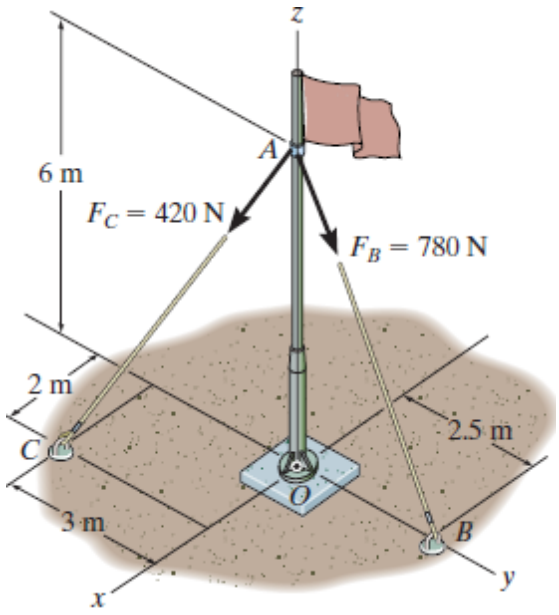
Philadelphia University **Faculty of Engineering**

Mech. Engineering Department **Statics(620211)**

Quiz:2-B 2d Sem. 2015 **Dr.Nabil musa**

Detrmine the moment produce by force F_B about point O.



$\mathbf{r}_{OA} = \{6\mathbf{k}\}$ m

$\mathbf{r}_{OC} = (2-0)\mathbf{i} + (-3-0)\mathbf{j} + (0-0)\mathbf{k} = [2\mathbf{i} - 3\mathbf{j}]$ m

The force vector $\mathbf{F}_C$ is given by

$$\mathbf{F}_C = F_C \mathbf{u}_{BC} = 420\left[\frac{(2-0)\mathbf{i} + (-3-0)\mathbf{j} + (0-6)\mathbf{k}}{\sqrt{(2-0)^2 + (-3-0)^2 + (0-6)^2}}\right] = [120\mathbf{i} - 180\mathbf{j} - 360\mathbf{k}]\text{N}$$

Vector Cross Product: The moment of $\mathbf{F}_C$ about point O is given by

$$\mathbf{M}_O = \mathbf{r}_{OA} \times \mathbf{F}_C = \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ 0 & 0 & 6 \\ 120 & -180 & -360 \end{vmatrix} = [1080\mathbf{i} + 720\mathbf{j}]\text{N} \cdot \text{m} \qquad \textbf{Ans.}$$

or

$$\mathbf{M}_O = \mathbf{r}_{OC} \times \mathbf{F}_C = \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ 2 & -3 & 0 \\ 120 & -180 & -360 \end{vmatrix} = [1080\mathbf{i} + 720\mathbf{j}]\text{N} \cdot \text{m} \qquad \textbf{Ans.}$$