Name – Surname:

No.:

Istanbul Technical University – Faculty of Aeronautics and Astronautics 01.11.2019
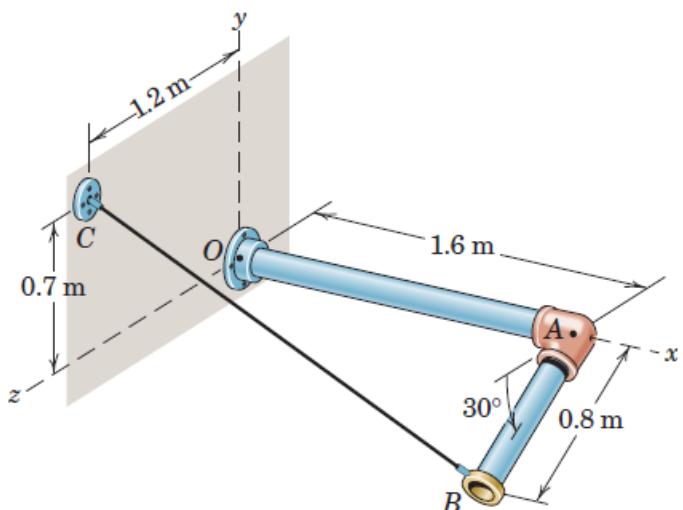**2019-2020 Fall Term**
15549 STA201E Statics

Quiz – 5 - SOLUTION

Problem: The cable *BC* carries a tension of 750 N. Calculate the moment of the force that the cable applies to the elbow about the point *O*.

Solution:

$$\vec{\lambda}_{BC} = \frac{\overrightarrow{BC}}{|\overrightarrow{BC}|} = \frac{-1.6\vec{\imath} + (0.7 + 0.8\sin 30)\vec{\jmath} + (1.2 - 0.8\cos 30)\,\vec{k}}{2.007} = -0.797\vec{\imath} + 0.548\vec{\jmath} + 0.253\vec{k}$$

$$\vec{T}_{BC} = T_{BC}\vec{\lambda}_{BC} = (750)\left(-0.797\vec{\imath} + 0.548\vec{\jmath} + 0.253\vec{k}\right) = -598\vec{\imath} + 411\vec{\jmath} + 189.8\vec{k}\ \ N$$

$$\vec{r}_{OB} = \vec{r}_B = 1.6\vec{\imath} - 0.8\sin 30\,\vec{\jmath} + 0.8\cos 30\,\vec{k} = 1.6\vec{\imath} - 0.4\vec{\jmath} + 0.693\vec{k}\ \ m$$

$$\vec{M}_O = \vec{r} \times \vec{F} = (750)\begin{vmatrix} \vec{\imath} & \vec{\jmath} & \vec{k} \\ 1.6 & -0.4 & 0.693 \\ -0.797 & 0.548 & 0.253 \end{vmatrix} = -360.7\vec{\imath} - 717.8\vec{\jmath} + 418.5\vec{k}\ \ Nm$$