28-Jan-2015

Lecture - 6 CONT'D

Sample Problem (slides)

* Cartesian Vector Approach.

$$\vec{r}_c = (0.2\cos 45\,\vec{i} - 0.05\,\vec{j} - 0.2\sin 45^\circ\,\vec{k})\ m$$

$$\vec{F}\ (\text{in } x\text{-}z \text{ plane}) = -F\cos 30^\circ\,\vec{i} + 0\,\vec{j} + F\sin 30^\circ\,\vec{k}$$

$$\vec{u}\ (\text{along } y\text{-axis}) = 0\,\vec{i} + 1\,\vec{j} + 0\,\vec{k}$$

$$M_y = \begin{vmatrix} u_x & u_y & u_z \\ r_x & r_y & r_z \\ F_x & F_y & F_z \end{vmatrix} = \begin{vmatrix} 0 & 1 & 0 \\ 0.2\cos 45^\circ & -0.05 & 0.2\sin 45^\circ \\ -F\cos 30^\circ & 0 & F\sin 30^\circ \end{vmatrix}$$

$$= 1\left(0.2\cos 45^\circ F\sin 30^\circ - (0.2\sin 45^\circ(-F\cos 30^\circ)\right)$$

* Problem 4-50: The chain AB exerts a force of 20 lb on the door at B. Determine the magnitude of the moment of this force along the hinged axis x of the door