
1.6 A hollow transmission shaft \( AB \) is supported at \( A \) and \( E \) by bearings and loaded as depicted in Figure P1.6. Calculate the following:

\[
\begin{align*}
F_1 &= 4 \text{ kN}, \quad F_2 = 3 \text{ kN}, \quad F_3 = 5 \text{ kN}, \quad F_4 = 2 \text{ kN}
\end{align*}
\]

(1) The torque (\( T \)) required for equilibrium (2) The reactions at the bearings

1.8 A bent rod is supported in the \( xy \) plane by bearings at \( B, C, D \) and loaded as shown in Figure P1.8. Dimensions are in millimeters. Calculate moment and shear force in the rod on the cross section at point \( E \), for \( P_1 = 200 \text{ N} \) and \( P_2 = 300 \text{ N} \).
Non-text problems:

1. Graph the shear and moment diagrams on a computer, for the beam in figure 1, using the values in table 1. 

   **Hint:** The moment diagram at the support should be negative (make sure you understand why).

<table>
<thead>
<tr>
<th>L</th>
<th>P</th>
<th>w</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 ft</td>
<td>10 kips</td>
<td>2 kip/ft</td>
</tr>
</tbody>
</table>

   Table 1: Values for beam

   ![Figure 1: Beam for non-text problem 1](image)

2. Rigorously demonstrate that $\tau_{xz} = \tau_{zx}$. I expect pictures and math! This information will not be covered until Wednesday.

   **Hint:** Use the handout that shows $\tau_{xy} = \tau_{yx}$.