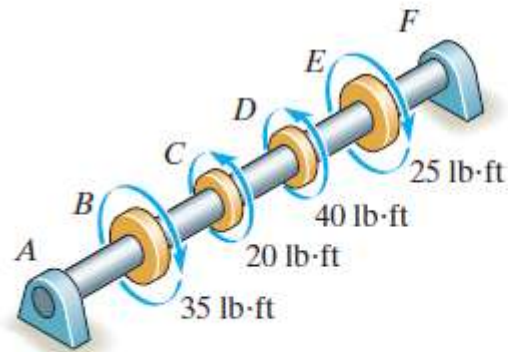


**5-6.** The solid shaft has a diameter of 0.75 in. If it is subjected to the torques shown, determine the maximum shear stress developed in regions *BC* and *DE* of the shaft. The bearings at *A* and *F* allow free rotation of the shaft.



Since the bearings at A and F are free,  $\therefore$  the internal torques are equal to applied torques.

Torque Equation:

$$\frac{\tau_{max}}{R} = \frac{T_{max}}{J}$$

$$\Rightarrow \tau_{max} = \frac{T_{max, BC}}{J} \times R$$

$$\Rightarrow \tau_{BC, \max} = \frac{T_{\max, BC}}{J} \times R$$

$$= \frac{35 \times 12 \times 0.0375}{\frac{\pi}{2} (0.375)^4} = 5.67 \text{ ksi}$$

Similarly:

$$\tau_{DE, \max} = \frac{25 \times 12 \times 0.375}{\frac{\pi}{2} (0.375)^4} = 3.62 \text{ ksi}$$

This problem was solved by Civil Thinking (<https://civilthinking.com>)

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