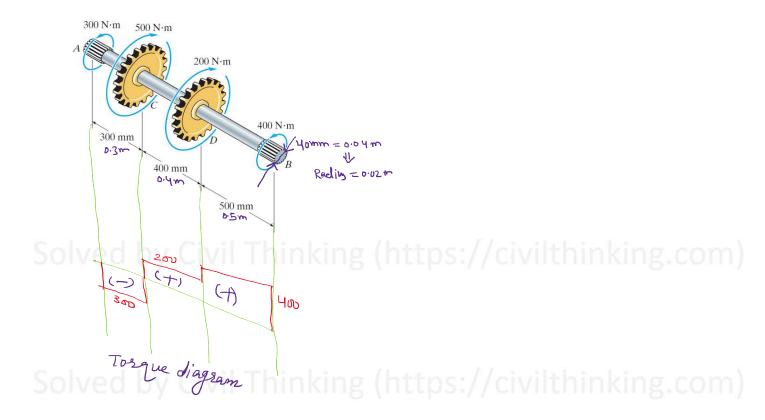*5-56. The splined ends and gears attached to the A-36 steel shaft are subjected to the torques shown. Determine the angle of twist of end B with respect to end A. The shaft has a diameter of 40 mm.

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observation:

from torque diagram, internal torque varies in different spans of the shaft. therefore we use Σ i.e.

$$\theta = \Sigma \frac{TL}{GJ} = \frac{1}{GJ} \Sigma TL$$

$$[\because G, J = \text{constant}]$$

To find!

$$\theta_{B/A}$$

$$\theta_{B/A} = \theta_{B/D} + \theta_{D/C} + \theta_{C/A}$$

$$\theta_{B/A} = \theta_{B/D} + \theta_{D/C} + \theta_{C/A}$$

$$= \frac{1}{75(10^9) \times \frac{\pi}{2} \times 0.02^4} \left[\begin{array}{c} (450 \times 0.5) + (200 \times 0.4) \\ + (-350 \times 0.3) \end{array} \right]$$

$$= 0.01008 \text{ radians} \times \frac{180}{\pi} = 0.578° \text{ ANS.}$$

To convert Radians into degree.