

Section-5

Q2 Ans:- Following are the assumption made for the derivation of torsion equation:

- The material is homogeneous.
- The material should follow Hooke's law
- The material should have shear stress proportional to shear strain.
- cross sectional area should be circular
- every diameter of the material should rotate through the same angle.
- The stress of the material should not exceed the elastic limit.

Consider a solid circular shaft with radius R , that is subjected to a torque T at one end and the other end under the same torque.

$$\text{Angle in radians} = \frac{\text{arc}}{\text{radius}}$$

$$\text{Arc } AB = R\theta = L\gamma$$

$$\gamma = \frac{R\theta}{L}$$

where,

A and B: two fixed points on the circular shaft

γ : angle subtended by AB.

$$G = \frac{T}{\gamma} \text{ (modulus of rigidity)}$$

where,

Shear Stress

γ : Shear Strain

$$\frac{T}{G} = \tau \therefore \frac{R\theta}{L} = \frac{T}{G}$$
