1. What type of stress and strain are present in circular shafts subjected to a torque?

2. Draw the stress distribution **within the cross-section** and **along the length** of a circular shaft if the shaft is fixed on one end and free on the other. Assume a clockwise torque is placed at the free end.

3. Where is the stress maximum in a circular shaft?

4. What geometric and material properties are important for members subjected to torque?

5. What is the "torsion formula" and when is it appropriate to use on real bodies?

6. A solid circular shaft with diameter 50 mm is subjected to an internal torque of 10 kN-m. Determine the shear stress at 15 mm from the center.

7. A hollow circular shaft with an outer diameter 50 mm and thickness 10 mm is subjected to an internal torque of 20 kN-m. Determine the maximum shear stress.

8. A solid aluminum shaft has a diameter of 5 inches and is 3 feet long. The shaft is fixed at one end and free at the other. A counter-clockwise torque of 15 k-in is applied at the free end. If a second clockwise torque is applied at the midpoint of the shaft, how large can that torque be if the allowable shear stress is 20 ksi?

9. A steel tube having an outer diameter of 4 inches is used to transmit 5 hp when turning at 15 rev/min. Determine the inner diameter of the tube to the nearest 1/4 inch if the allowable shear stress is 15 ksi.

10. A motor delivers 500 hp to a tubular shaft with an outer diameter of 2 in and inner diameter of 1.75 in. If it is rotating at 200 rad/s, what is the maximum shear stress in the shaft?