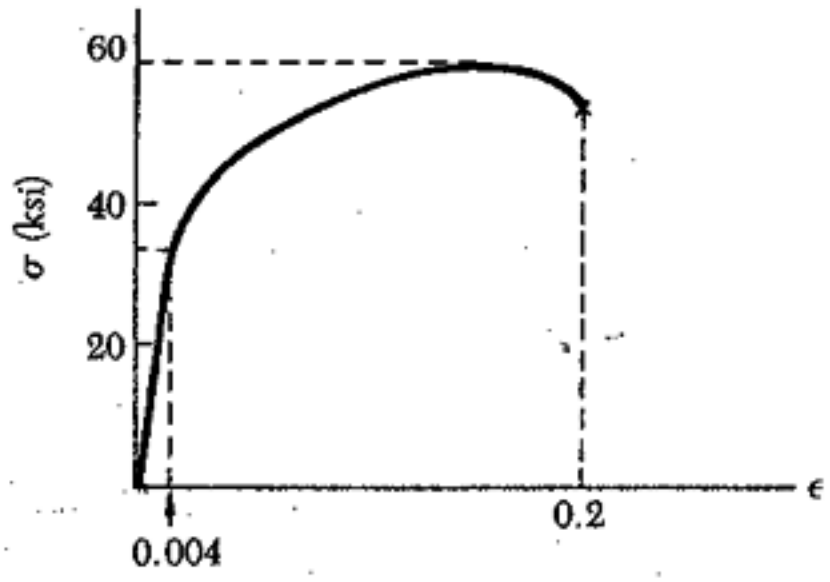
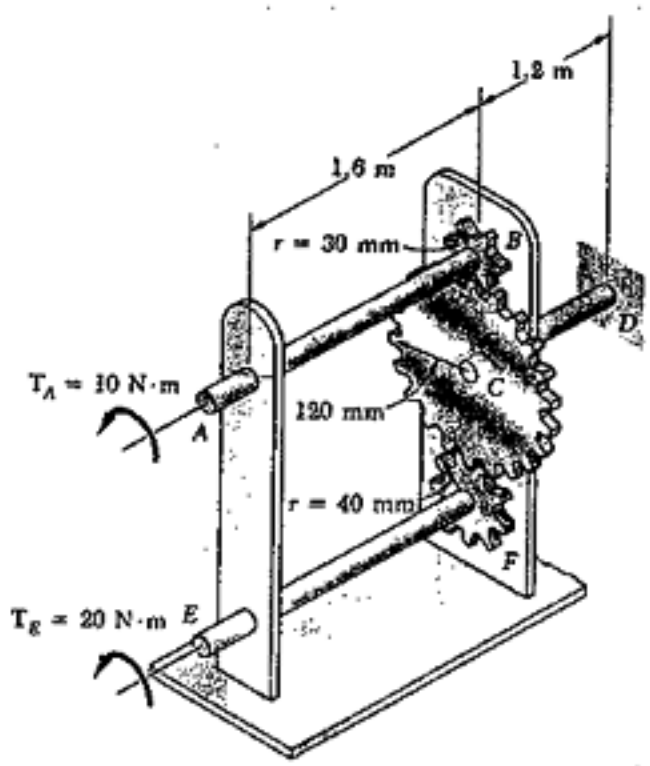
1. (20pts) Please define the following terms:
   (a) dilatation,
   (b) homogeneous and isotropic material,
   (c) shear center,
   (d) fully plastic moment,
   (e) plastic section modulus,
   (f) Tresca's yield criterion,
   (g) strain rosette,
   (h) strain energy density,
   (i) modulus of resilience,
   (j) modulus of rupture in torsion.

2. (10pts) The tensile stress-strain behavior of aluminum alloy is shown in the graphs below. Determine the following properties for pure aluminum. (a) Young's modulus (a) 0.2% offset yield strength, (c) ultimate stress, (d) fracture stress, (e) percent elongation.

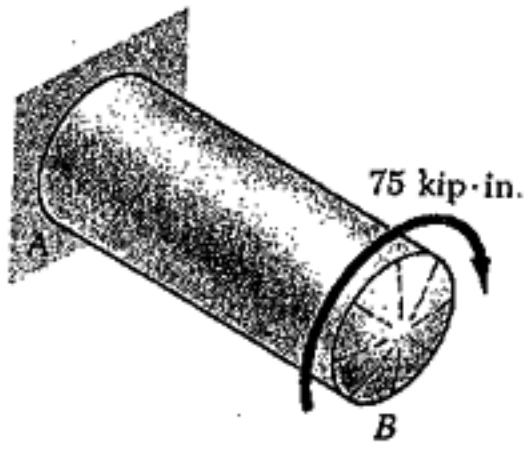


3. (20pts) Three solid shafts (G= 77 GPa), each of 18-mm diameter, are connected by the gear shown. For the given loading , determine the angle through which end A of shaft AB rotates.



(背面仍有題目,請繼續作答)

4. (20pts) A 75-kip · in. torque is applied to the end of a tank containing oil under a pressure of 400 psi. Knowing that the tank has a 10-in. outside diameter and a 0.25-in. wall thickness, determine the maximum normal stress and the maximum shearing stress in the cylindrical wall of the tank.



5. (30pts) For the beam and loading shown, determine the reaction at A and draw the bending-moment diagram.