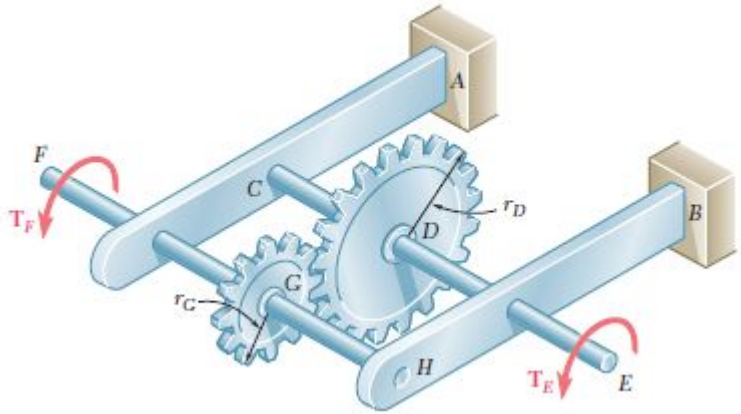
PROBLEM 1

Under normal operating conditions a motor exerts a torque of magnitude T = 136 N.m at F.

r_D = 200 mm, r_G = 76 mm., and the allowable shearing stress is 72 MPa in each shaft

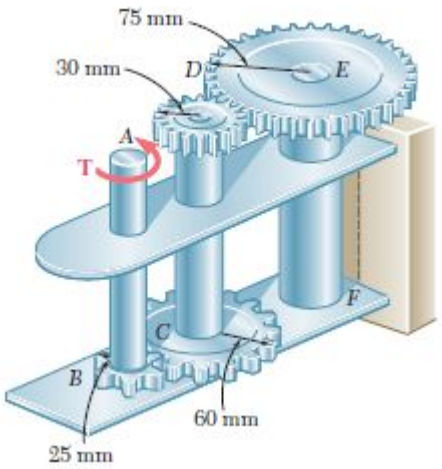
Determine the required diameter of (a) shaft CDE, (b) shaft FGH.



PROBLEM 2

A torque of magnitude T = 100 N. m is applied to shaft AB of the gear train. The diameters of the three solid shafts are, respectively, d_{AB} =21 mm, d_{CD} = 30 mm, and d_{EF} = 40 mm.

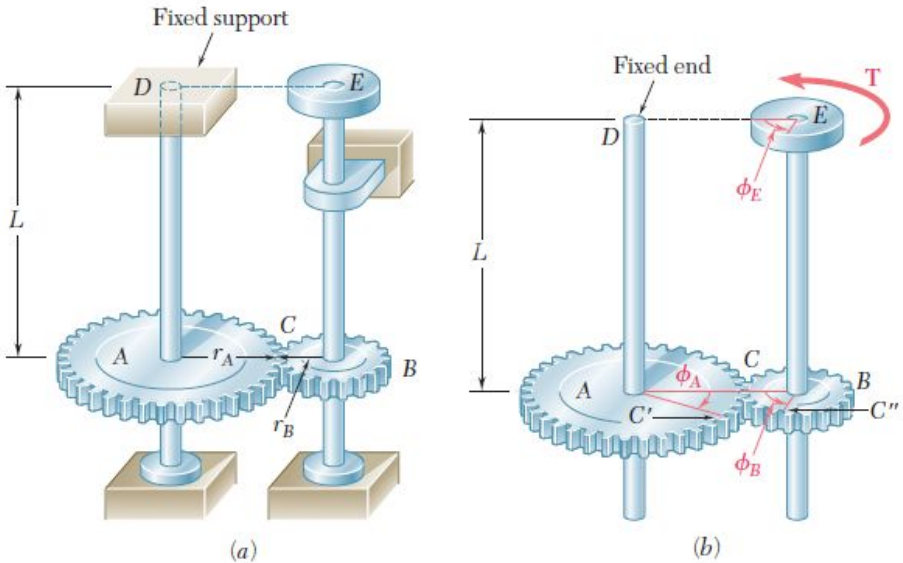
Determine the maximum shearing stress in
(a) shaft AB,
(b) shaft CD,
(c) shaft EF.



PROBLEM 3

$r_A = 2r_B$

Determine the angle of rotation of end E of shaft BE when the torque T is applied at E.

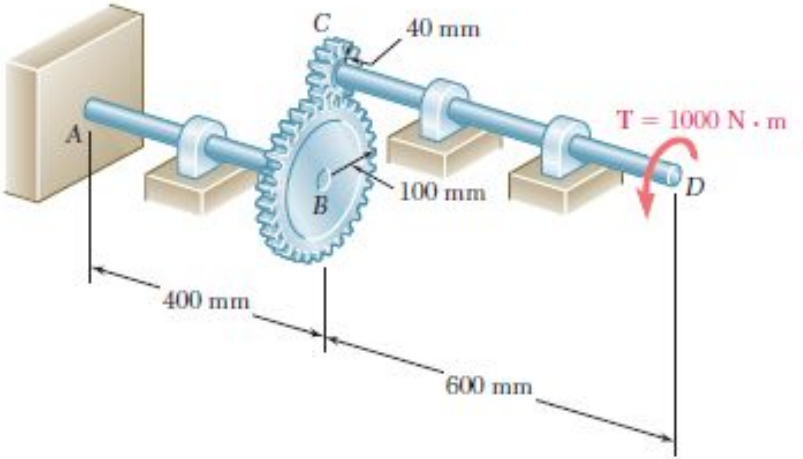


PROBLEM 4

The design of the gear-and-shaft system shown requires that steel shafts of the same diameter be used for both AB and CD.

It is further required that $t_{max} \leq 60$ MPa and that the angle ϕ_D through which end D of shaft CD rotates not exceed 1.5^0.

Knowing that G = 77 GPa, determine the required diameter of the shafts.



PROBLEM 5

Ends A and D of the two solid steel shafts AB and CD are fixed,
while ends B and C are connected to gears as shown. Knowing that a 4-kN. m torque T is applied to gear B, Determine the maximum shearing stress
(a) in shaft AB,
(b) in shaft CD.