Answer the following two questions at the same paper:

QUESTION ONE (10 points):

The L-shaped loading frame in Fig. 1 is supported by a high-strength shear pin (d_p= 1.27 cm, τ_y= 0.344 GPa) and by a tie-rod AB (d_r = 1.58 cm, σ_y = 0.344 GPa). Both the tie-rod and the pin are to be sized with a factor of safety of 3.0, the tie-rod with respect to tensile yielding, and the shear pin with respect to yield shear. Determine the allowable platform load, W_{allow}.. Let L1 = 0.9 m, L2 = L3 = 1.22 m.
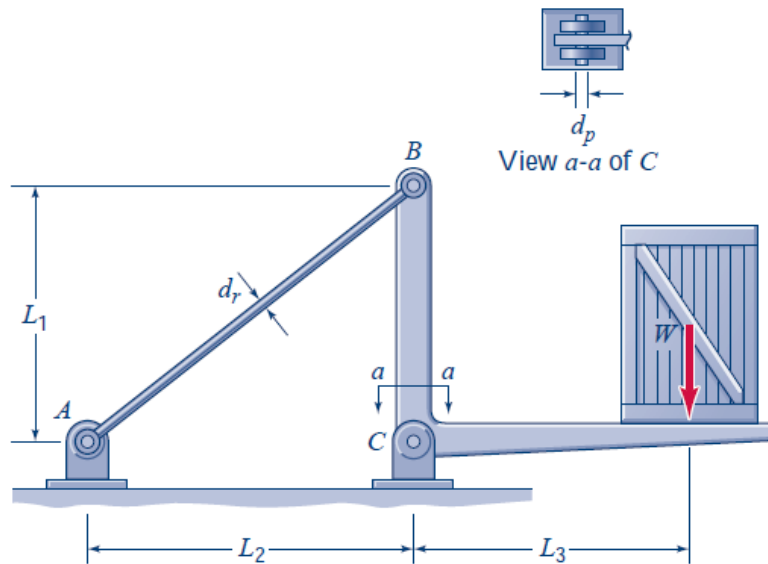

Figure 1.

QUESTION TWO (10 points):

A tubular shaft of outer diameter $d_o = 50$ mm and inner diameter $d_i = 40$ mm drives a wind turbine that is producing 7 kW of power. (Assume 100% efficiency of the turbine.) If the allowable shear stress in the steel shaft is $\tau_{allow} = 50$ MPa, what is the slowest speed, ω_{min}, at which the blades may be allowed to rotate? (Neglect stresses in the shaft other than ones that are directly due to torsion.)
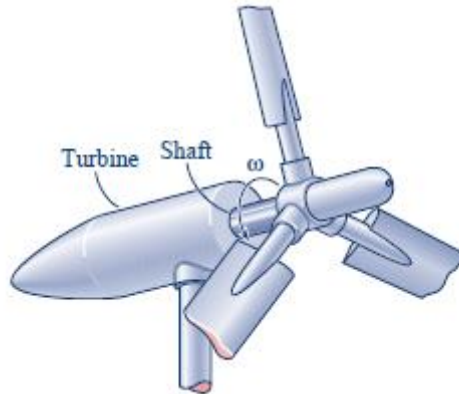

Figure 2.