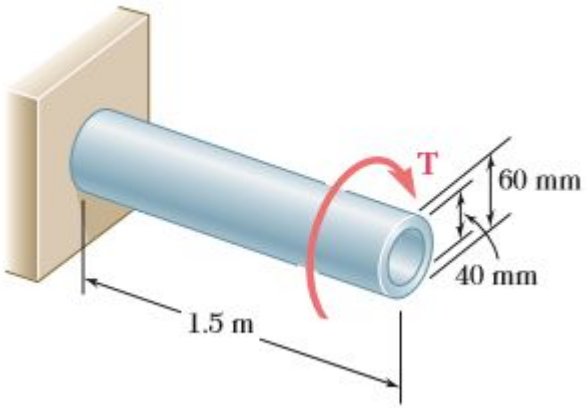
Question 1

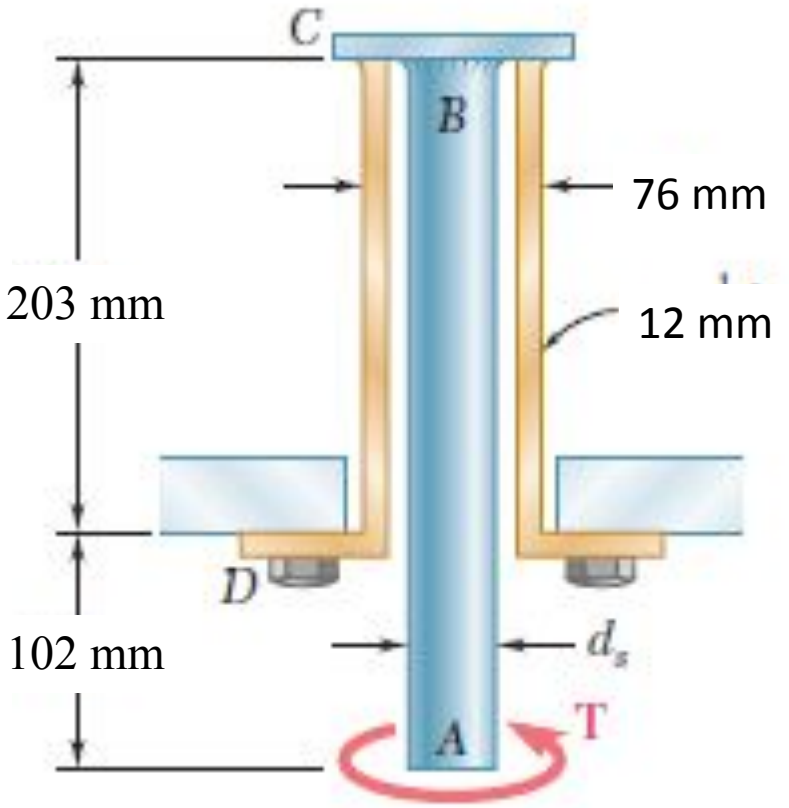


A hollow cylindrical steel shaft is 1.5 m long and has inner and outer diameters respectively equal to 40 and 60 mm. (a) What is the largest torque that can be applied to the shaft if the shearing stress is not to exceed 120 MPa? (b) What is the corresponding minimum value of the shearing stress in the shaft?

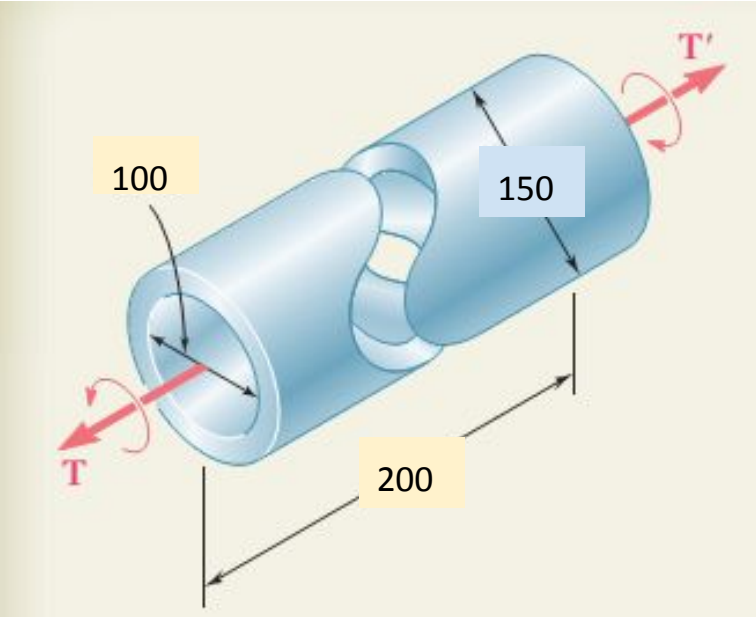
Question 2

Tutorial 7 : Chapter 3
Mechanics of Materials

The solid spindle *AB* has a diameter $d_s = 38\ mm$. and is made of a steel with an allowable shearing stress of 83 MPa, while sleeve *CD* is made of a brass with an allowable shearing stress of 48 MPa. Determine the largest torque **T** that can be applied at *A*.



Question 3

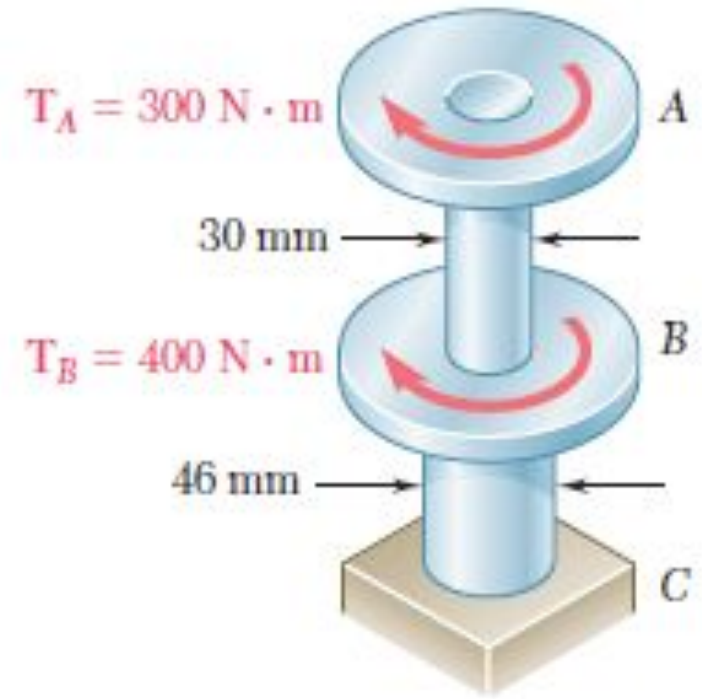


[All dimensions are in mm]

The The preliminary design of a large shaft connecting a motor to a generator calls for the use of a hollow shaft with inner and outer diameters of 100 mm and 150 mm, respectively. Knowing that the allowable shearing stress is 83 MPa, determine the maximum torque that can be transmitted (a) by the shaft as designed, (b) by a solid shaft of the same weight, (c) by a hollow shaft of the same weight and of 200 mm outer diameter.

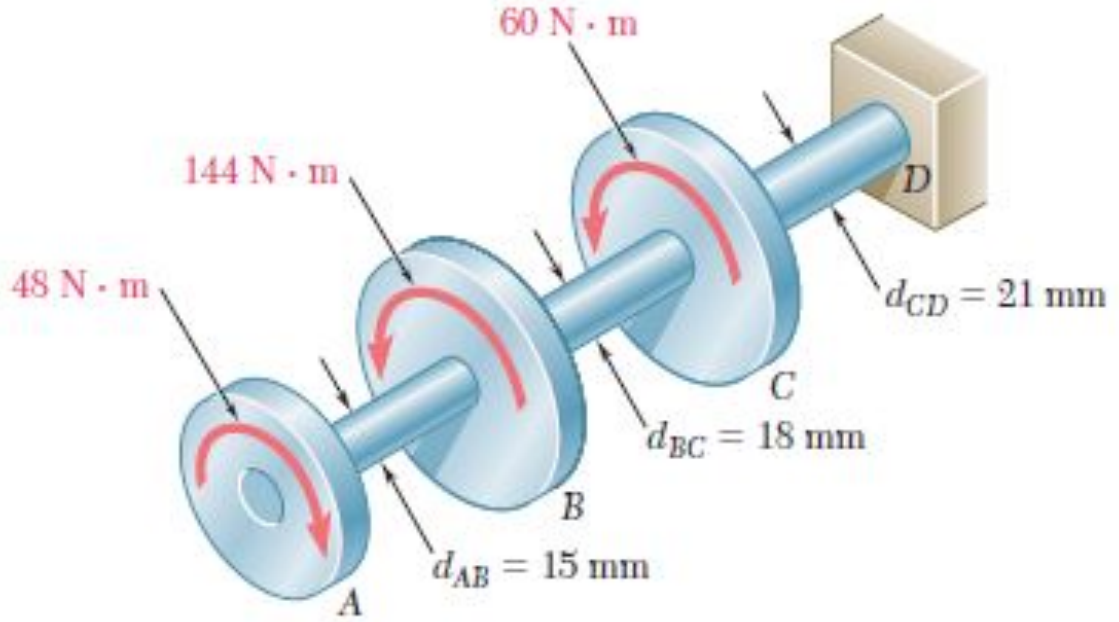
Question 4

The torques shown are exerted on pulleys *A* and *B*. Knowing that both shafts are solid, determine the maximum shearing stress in (*a*) in shaft *AB*, (*b*) in shaft *BC*.



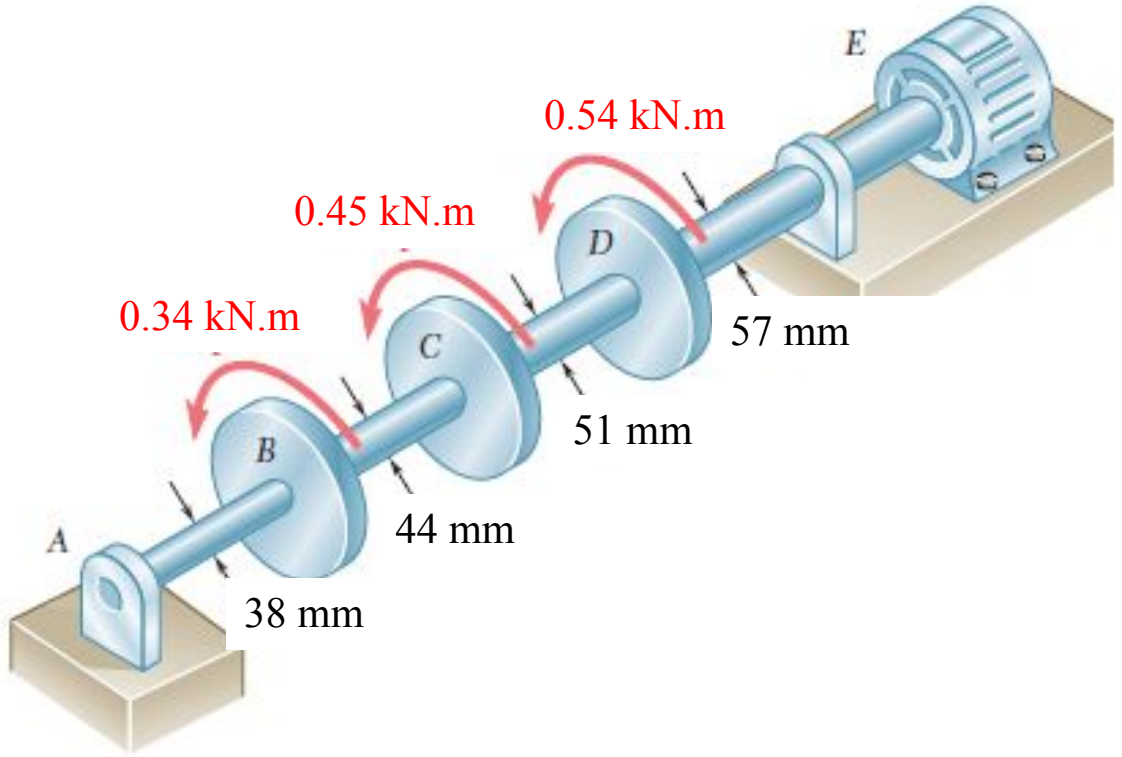
Question 5

Knowing that each of the shafts *AB*, *BC*, and *CD* consists of a solid circular rod, determine (*a*) the shaft in which the maximum shearing stress occurs, (*b*) the magnitude of that stress.

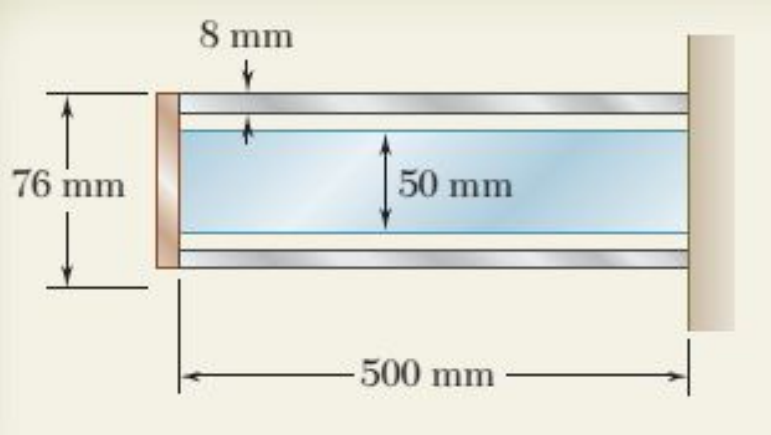


Question 6

Under normal operating conditions, the electric motor exerts a 1.33 kN-m torque at *E*. Knowing that each shaft is solid, determine the maximum shearing stress in (*a*) shaft *BC*, (*b*) sl *CD*, (*c*) shaft *DE*.

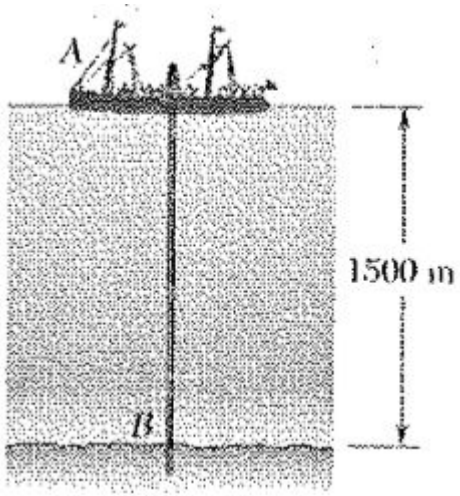


Question 7



A steel shaft and an aluminum tube are connected to a fixed support and to a rigid disk as shown in the cross section. Knowing that the initial stresses are zero, determine the maximum torque T_0 that can be applied to the disk if the allowable stresses are 120 MPa in the steel shaft and 70 MPa in the aluminum tube. Use G = 77 GPa for steel and G = 27 GPa for aluminum

Question 8



The ship A has just started to drill oil on the ocean floor at a depth of 1500 m. The top of the steel drill rotates through two complete revolutions before the drill bit at B starts to operate. Determine the maximum shear stress caused by in the pipe by torsion. Diameter is 200 mm. G is 77.2 GPa.

Question 9

A torque of magnitude T=1000 N.m is applied at D as shown. Knowing that the diameter of shaft AB is 56 mm and that the diameter of shaft CD is 42 mm, determine the maximum shearing stress in (a) shaft AB, (b) shaft CD.