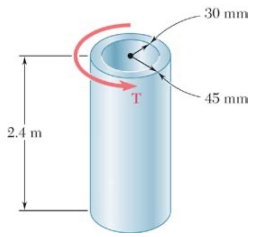
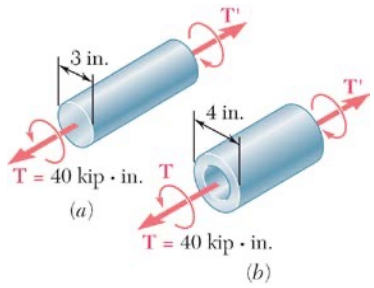
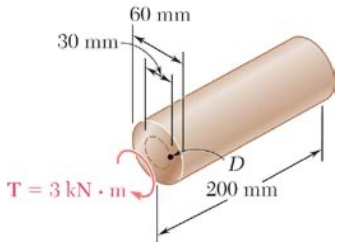
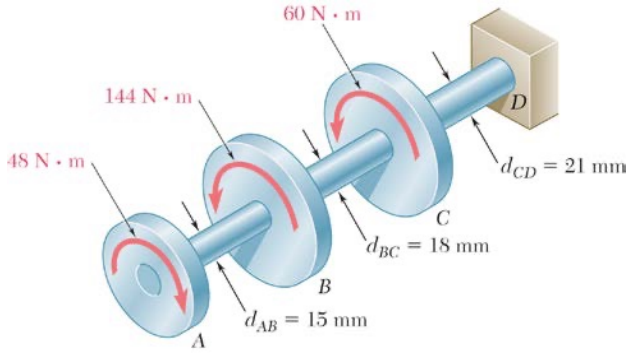
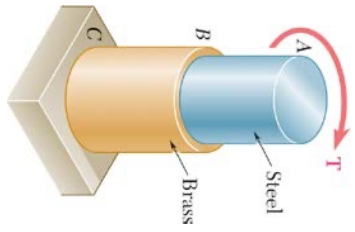
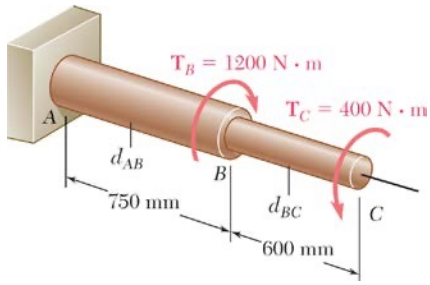
SOM- I: ASSIGNMENT – 2: TORSION (B. Tech. 2nd Year: 2019- 2020)

	(*a*) Determine the torque T that causes a maximum shearing stress of 45 MPa in the hollow cylindrical steel shaft shown. (*b*) Determine the maximum shearing stress caused by the same torque T in a solid cylindrical shaft of the same cross-sectional area.
	(*a*) For the 3-in.-diameter solid cylinder and loading shown, determine the maximum shearing stress. (*b*) Determine the inner diameter of the 4-in.- diameter hollow cylinder shown, for which the maximum stress is the same as in part *a*.
	A torque $T = 3$ kN m is· applied to the solid bronze cylinder shown. Determine (*a*) the maximum shearing stress, (*b*) the shearing stress at point *D* which lies on a 15-mm-radius circle drawn on the end of the cylinder, (*c*) the percent of the torque carried by the portion of the cylinder within the 15-mm radius.
	Knowing that an 8-mm-diameter hole has been drilled through each of the shafts *AB, BC*, and *CD*, determine (*a*) the shaft in which the maximum shearing stress occurs, (*b*) the magnitude of that stress.
	The allowable shearing stress is 15 ksi in the 1.5-in.-diameter steel rod *AB* and 8 ksi in the 1.8-in.-diameter brass rod *BC*. Neglecting the effect of stress concentrations, determine the largest torque that can be applied at *A*.
	The solid shaft shown is formed of a brass for which the allowable shearing stress is 55 MPa. Neglecting the effect of stress concentrations, determine the smallest diameters d_{AB} and d_{BC} for which the allowable shearing stress is not exceeded.
A ship's propeller shaft has external and internal diameters of 25 cm and 15 cm. What power can be transmitted at 1 10 rev/minute with a maximum shearing stress of 75 MN/ m^2, and what will then be the twist in degrees of a 10 m length of the shaft? G= 80 GN/ m^2.	

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A hollow marine propeller shaft running at 110 rpm is required to propel a vessel at 25 knots for the expenditure of 6300 KW, the efficiency of the propeller being 68%. The diameter ratio is 2/3 and the direct stress due to thrust is not to exceed 7.72 N/ mm^2. Calculate the shaft diameter and maximum shear stress due to torque. 1 knot = 0.515 m/sec.
A hollow shaft is to transmit 300 kW power at 80 RPM. If the shear stress is not to exceed 60 N/mm^2 and the internal diameter is 0.6 of the external diameter, find the external and internal diameters assuming that the maximum torque is 1.4 times the mean.
A hollow shaft, having an inside diameter 60% of its outer diameter, is to replace a solid shaft transmitting the same power at the same speed. Calculate the percentage saving in material, if the material to be used is also the same.