FALL Semester 2021-22

CAT1

MEE1032 Mechanics of Solids and Fluids D1+TD1

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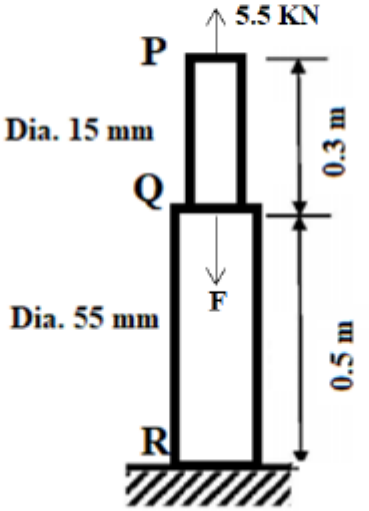
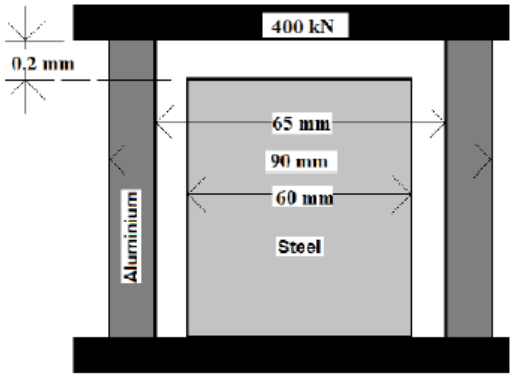
The rod PQR is made of steel of which modulus of elasticity is 180 G Pa, the magnitude of the load acting on the free end of the rod is 5.5 KN, find (a) the value of force 'F' when the deflection at P is zero, (b) the deflection at P when F=38 KN.



A solid steel cylinder 60 mm diameter is placed inside an aluminium cylinder having inside and outside diameters are 65 and 90, respectively. The aluminium cylinder is 0.2 mm longer than the steel cylinder. An axial load of 400 kN is applied to the bar and cylinder through the rigid cover plate covering the entire cross-section of the aluminium cylinder. Find the stress developed in the steel cylinder and the aluminium tube. Assume: E for Steel = 210 GN/m^2 and E for Aluminium = 72 GN/m^2.



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At a point within a shaft subjected to two mutually perpendicular directions, the Compressive stress in x-direction is 70 MPa and the compressive stress in y-direction is 58 MPa. The shear stress across these planes is 32MPa.

Find graphically (Mohr stress circle method)

a. the normal and shear stress on a plane making an angle 44^0 with the plane of first stress

b. the magnitude and direction of stresses on principle planes and planes of maximum shear stress.