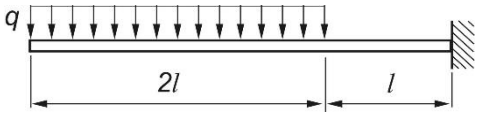
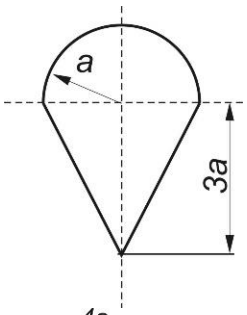
Bending

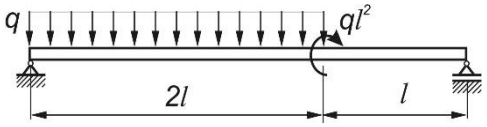
Draw shear force and bending moment diagram. Find the maximum bending moment. Calculate section modulus and maximum stresses in the beam. Assume that q,l,a are known

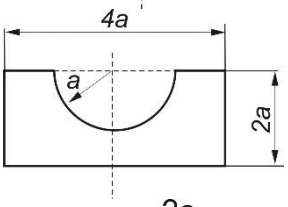
a)



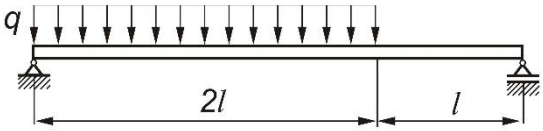


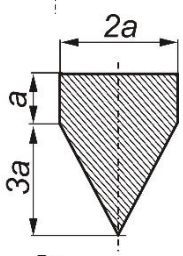
b)



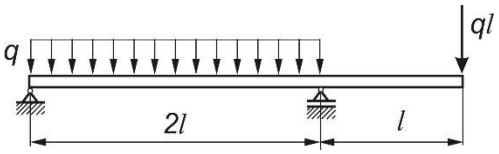


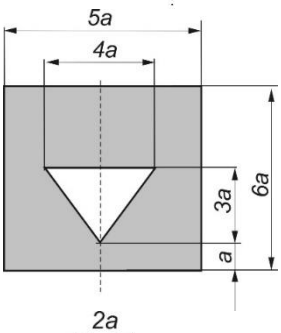
c)



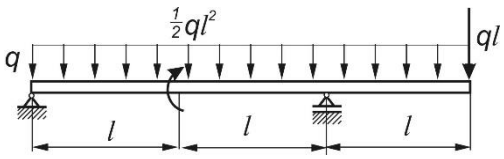


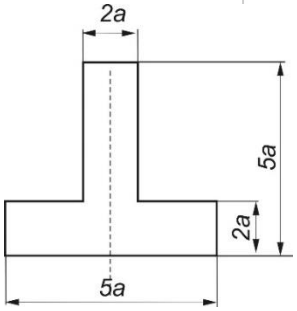
d)





e)

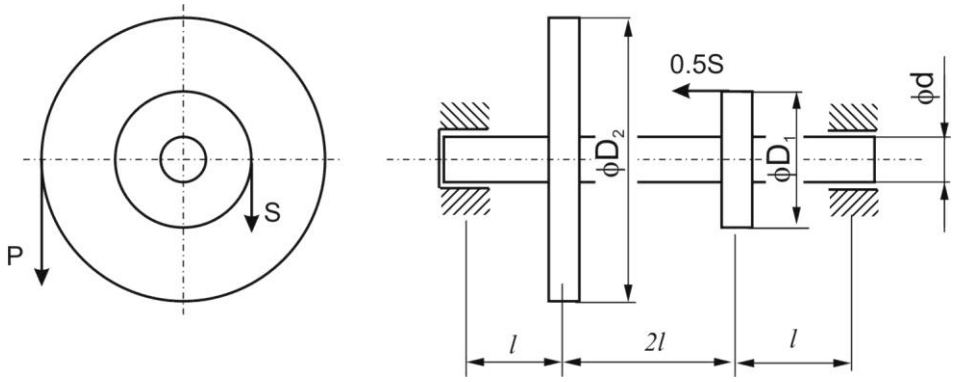




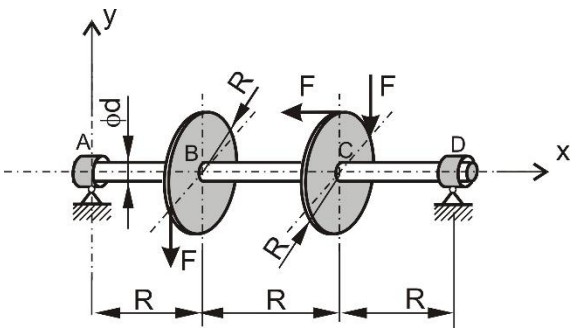
Combine loading

For the shaft presented in the figure find maximum equivalent stress. Prepare the diagrams of internal loads. Treat the bearings as joint supports.

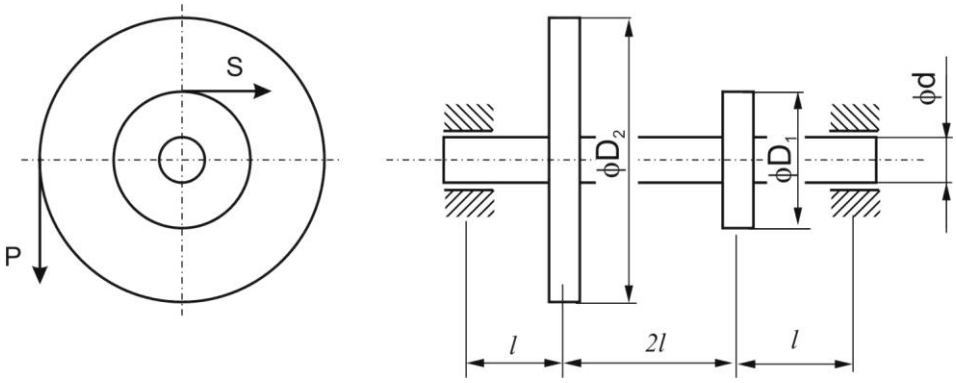
a) Assume S=500N, d=10mm, l=5d, D1=5d, D2=10d



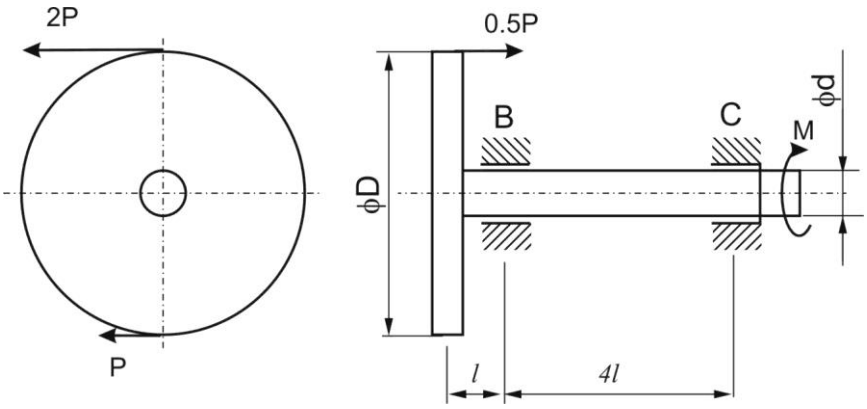
b) Assume F=300N, d=10mm, R=10d



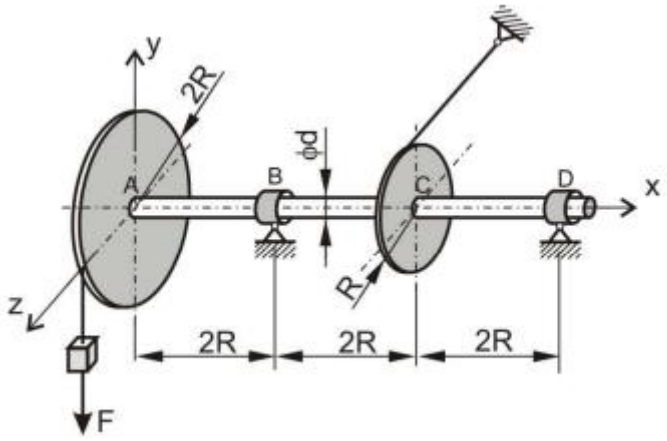
c) Assume S=500N, d=10mm, l=5d, D1=5d, D2=10d



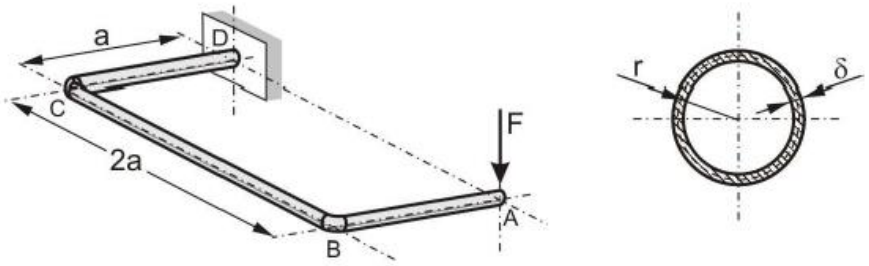
d) Assume P=500N, d=10mm, l=5d, D1=5d, D2=10d



e) Assume F=500N, d=10mm, R=5d



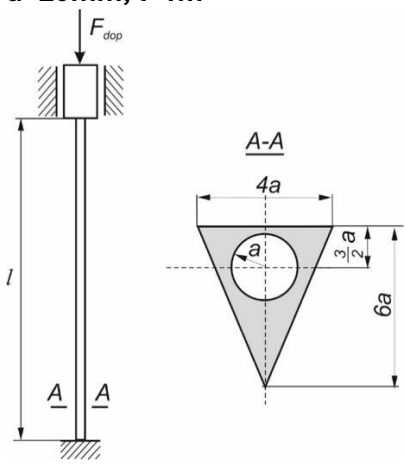
f) The frame **ABCD**, made of a thin-walled tube, is loaded at point **A** by a vertical force **F**. The dimensions of the frame are: lengths **AB = CD = a**, **BC = 2a**, the radius of the tube measured to the mid-thickness of the wall is **r**, and the wall thickness is **δ = r / 2π**. Determine the **maximum von Mises (reduced) stress**.



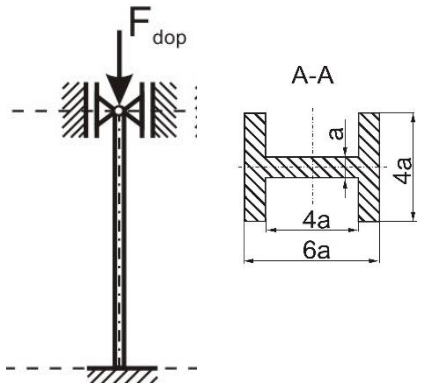
Buckling

For the bar presented in the figure find critical buckling load. Assume E=200GPa, R_e=240MPa, R_{prop} =200MPa. Dimension in figures are in mm.

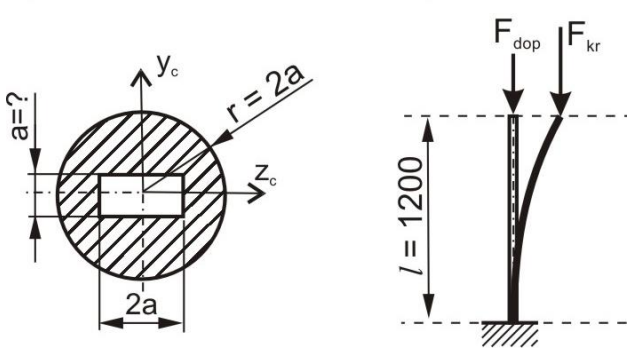
a) a=20mm, l=1m



b) a=20mm, l=1m



c)



d)