1. Find the deflection, caused by its own weight, of the free end C of the solid truncated 15% cone BC shown in Fig.(1). The weight density $\gamma$ of material is in newtons per cubic meter and the modulus of elasticity E is in newtons per square meter. Both are constants. All the dimensions of the truncated cone are in meters.

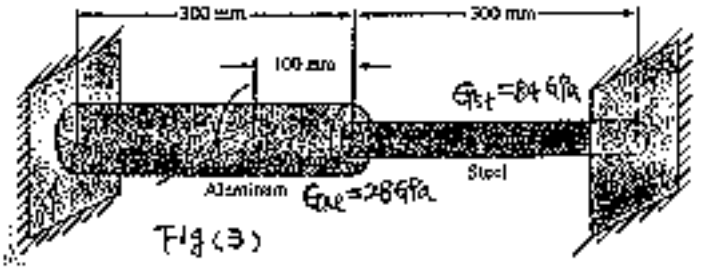
2. Fig.(2) depicts an assembly consisting of a steel bolt and an aluminum collar. The pitch* 15% of the single-threaded bolt is 3 mm, and its cross-sectional area is 600 mm$^2$ and $E_{st}$=210GPa. The cross-sectional area of the collar is 900 mm$^2$ and $E_{al}$ = 70 GPa. The nut is brought to a snug position and then given an additional 1/3 in turn. Determine the stresses in the aluminum collar and in the steel bolt. [* The lead l of a screw is the distance the screw advances along its axis in one full turn. For screws with multiple threads, the lead l is equal to the pitch p times the multiplicity of threads. Thus, $l = np$ and, for a single-threaded screw, $l = p$.]

3. Fig.(3) shows a composite step-shaft consisting of an aluminum section 50 mm in diameter 20% and a steel section 25 mm in diameter. The ends of the shaft are fixed so that rotation cannot occur there. Determine (a) the resisting torques exerted by the supports on the shaft and (b) the maximum stress in the aluminum and the maximum stress in the steel.

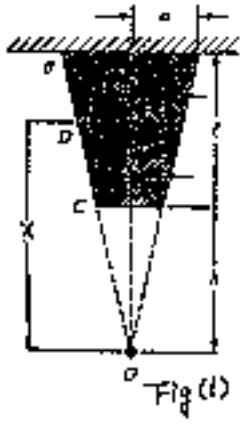
4. A vertical 4.80 kN load is applied as shown on a wooden post of rectangular cross section, 25% 80 by 120 mm. [Fig.(4)] (a) Determine the stress at points A, B, C and D (b) Locate the neutral axis of the cross section.

5. For the beam and loading, as shown Fig(5), Determine (a) the equation of the elastic curve 25% (b) the slope at end A (c) the maximum deflection.

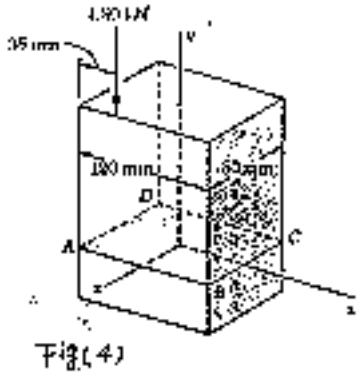
Fig(2)



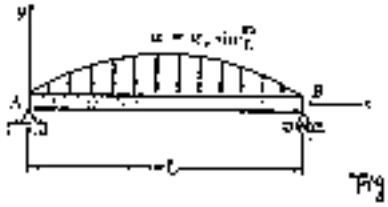
Fig(3)



Fig(1)



Fig(4)



Fig(5)