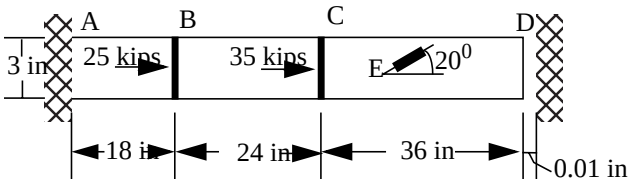
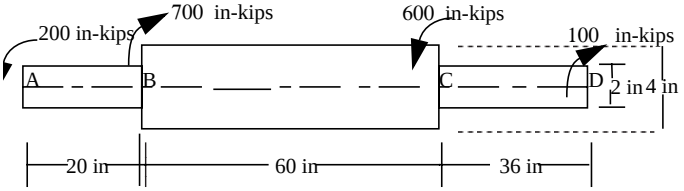
EXAM 2 EM 342 Feb 9, 1994

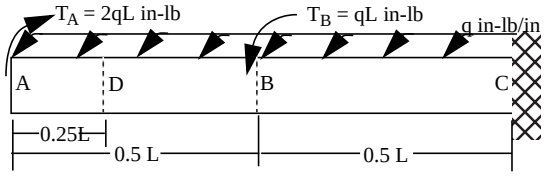
1.A rectangular steel (E = 30,000 ksi, ν=0.25) bar of 0.5 inch thickness has a gap of 0.01 inch between the section at D and a rigid wall before the forces are applied. Assuming that the applied forces are sufficient to close the gap determine: (a) the movement of section at C with respect to the left wall.(b) the strain recorded by the strain gage at point E. The strain gage is mounted at 20^o to the axis as shown



2.A solid circular steel (G_s = 12,000 ksi) shaft is loaded as shown. Determine: (a)the angle of rotation of section at D with respect to section at A. (b) the maximum shear stress



3.(a) A circular shaft has a uniform distributed torque of q in-lb/in and two concentrated torques as shown. Determine the internal torque acting on the section at D

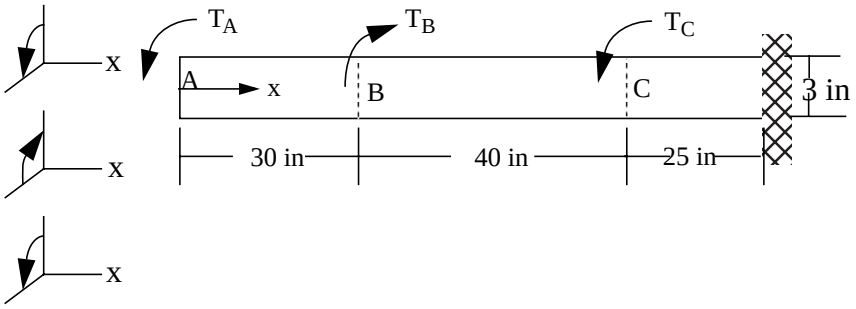


(b) The rotation of three sections of a circular shaft due to the applied torques are as given below. Determine the maximum shear strain in section BC

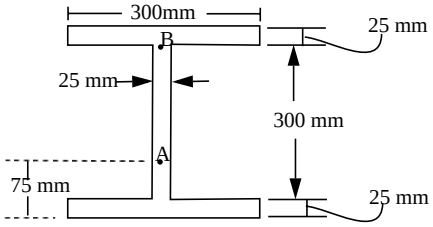
θ_A = 0.016 rads

θ_B = 0.024 rads

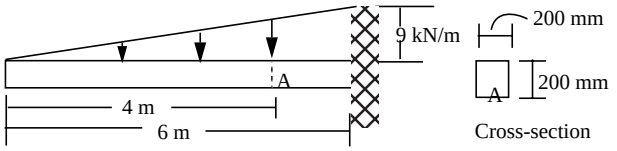
θ_C = 0.036 rads



(c) The fiber stress at point A in a section of a beam was found to be σ_A = 80 MPa (T) . Determine the fiber stress at point B which is at the junction of the web and flange as shown.



(d) Determine the fiber stress at point A which is at the bottom of the beam.



Answers:

1. u_c = 0.025 in- ε_E = -358 μ
2. $\theta_D - \theta_A$= 0.303 rads clock-wise τ_{max} =127.3 ksi-
3. (a) T_D = 1.758 qL (b) γ_{max} = 2250 μ
   (c) σ_B = 120 MPa (C (d) σ_A = 12 MPa-(C)