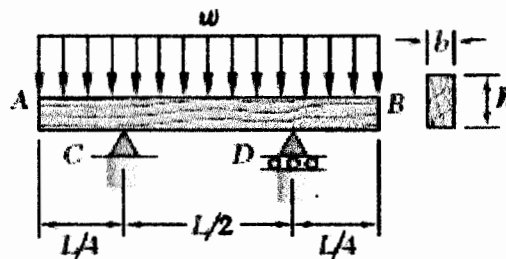
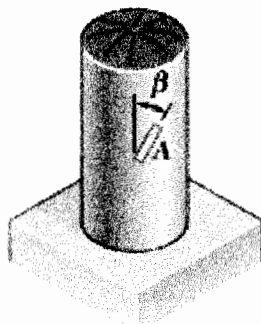


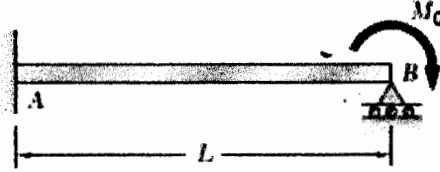
1. (20pts) Please define the following terms:
 (a) percent reduction in area, (b) Poisson's ratio, (c) idealized elastoplastic material, (d) dilatation, (e) shear strain, (f) residual stress, (g) modulus of rupture in bending, (h) elastic section modulus, (i) shear center, (j) strain energy.
2. (10pts) What are the stress components of a point in a body under general loading condition? Prove that the shear stress component τ_{xy} is equal to τ_{yx} .
3. (10pts) Use the stress components to show the state of plane stress and the state of plane strain? Find the principal stresses and maximum shear stress for each state.
4. (15pts) A timber beam AB of length L and rectangular cross section carries a uniformly distributed load w and is supported as shown. Show that the ratio τ_m/σ_m of the maximum values of the shear and normal stresses in the beam is equal to $2h/L$, where h and L are the depth and the length of the beam, respectively.



5. (15pts) A single strain gage A forming an angle $\beta = 30^\circ$ with the vertical is used to determine the gage pressure in the cylindrical steel tank shown. The cylindrical wall of the tank is 10 mm thick, has a 900 mm inner diameter, and is made of a steel with $E = 200$ GPa and $\nu = 0.30$. Determine the pressure in the tank corresponding to a gage reading of 220×10^{-6} mm/mm ($\cos 30^\circ = 0.866$).



6. (10pts) For the beam and loading shown, determine the reaction at the roller support.



7. (20pts) For the beam and loading shown, determine the deflection at end A , (b) the slope at end D .

