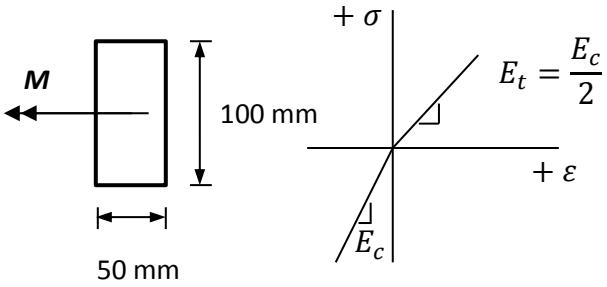
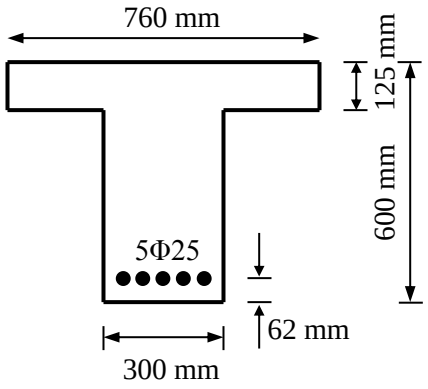
CE224 STRENGTH OF MATERIALS

HW2 (Due:28/11/2014)

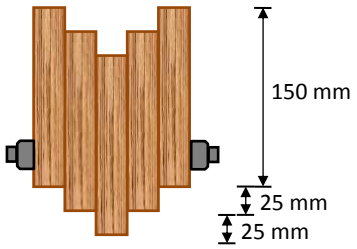
1. The rectangular beam shown is made of a plastic for which the value of the modulus of elasticity in tension is one-half its value in compression. For a bending moment $M = 600N.m$ determine the maximum a) tensile stress, b) compressive stress



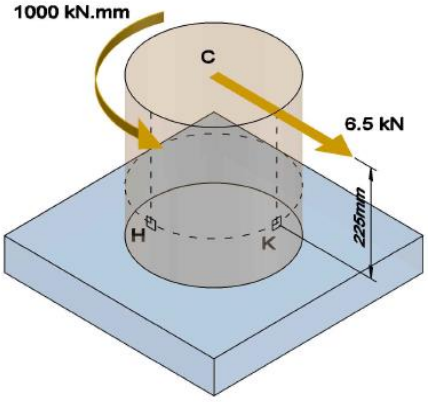
2. Knowing that the bending moment in the reinforced concrete beams shown is +200 kN.m and that the modulus of elastic is 25 GPa for the concrete and 200 GPa for the steel, determine a) the stress in the steel, b) the max stress in the concrete.($\Phi 25$ = 25 mm).



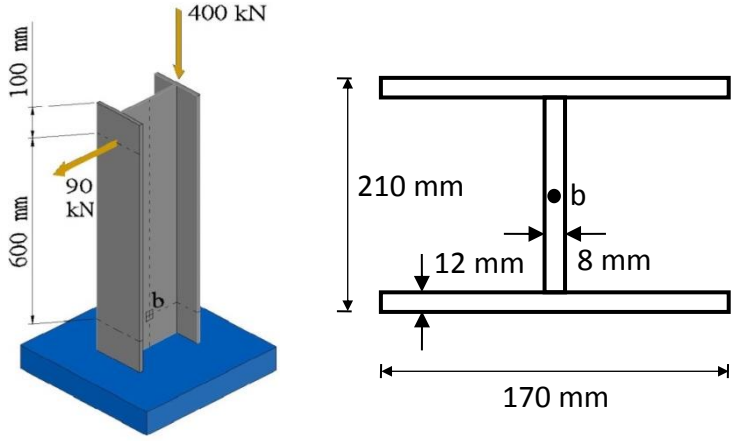
3. A beam consists of five planks of 38x150-mm cross section connected by steel bolts with a longitudinal spacing of 220 mm. Knowing that the shear in the beam is vertical and equal to 8 kN and that the allowable average shearing stress in each bolt is 50 MPa, determine the smallest permissible bolt diameter that may be used.



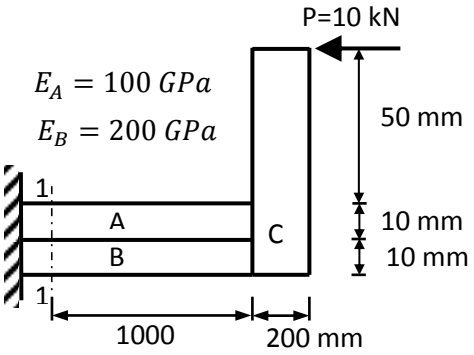
4. A 6.5 kN force and a 1000 N.m couple are applied at the top of the 62 mm diameter cast-iron post shown. Determine the normal and shearing stresses at a) point H, b) point K.



5. Two forces are applied to a section which is shown figure below is made of rolled-steel beam. Determine maximum shearing stress at point b.



6. The built-up beam is made by welding three different members as shown below. Knowing that member C is infinitely rigid under the bending. Determine σ_{max} in A and B both tension and compression for section 1-1.(Thickness of A and B = t mm)



7. The below built-up section is generated by firstly welding the 10x200mm bottom plate to a 12x300mm plate. Then, the web of the built-up section is reinforced by nailing an L plate of 50x300mm at locations B and C, another L plate of 50x260mm at location C only and a 8x40mm rectangular plate at point B only. Finally, the top plate is connected to the whole section by nailing at point A. Note that there is no connection between 12x300 plate and the top plate. The spacing of nails at each location is 100mm. Determine the shear force carried by each nail given that there is a constant shear of 100kN on this built-up section.