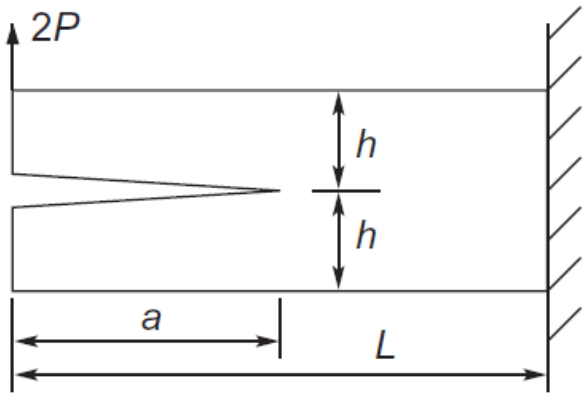
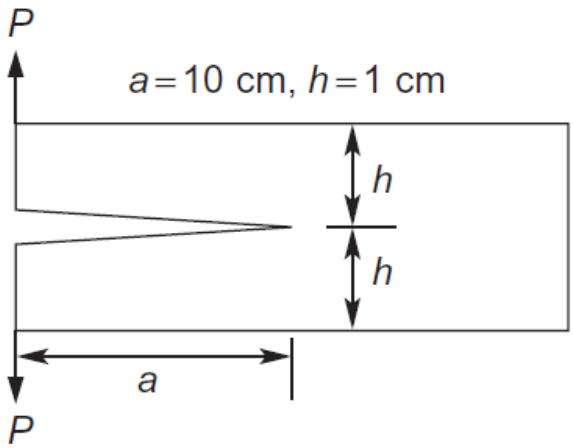
1- Calculate the J integral for the split beam (of unit width) loaded as shown in following figure.



2- A split beam of 2 mm wide is loaded as shown in following figure. Assume that the yield stress of the material is 500 MPa. Find the load P that produces a plastic zone size of 2 mm ahead of the crack tip, using the methods that are available to you, given Young's modulus E= 70 GPa.



3- A thin plate with a center crack is loaded with uniform tensile stresses as shown in following figure 7.16. The elastic-perfectly plastic ductile material has Young's modulus of 70 GPa and yield stress of 400 MPa. Fracture tests are conducted and failure is found to occur when the net section stress reaches the yield stress. lot the applied stress at failure as a function of a=W. If the net-section failure is interpreted as fracture failure, find fracture toughness K_c using Irwin's plastic zone adjustment method and plot it as a function of a=W. This plot will indicate that K_c is specimen size dependent and is not suitable for characterizing this type of "ductile fracture."