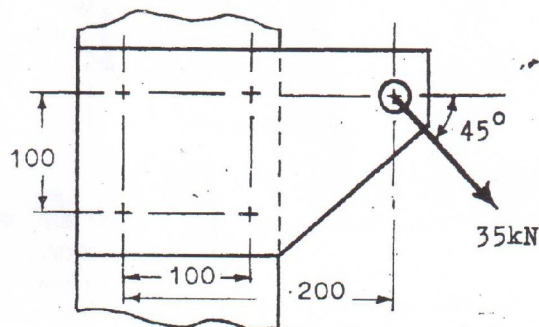


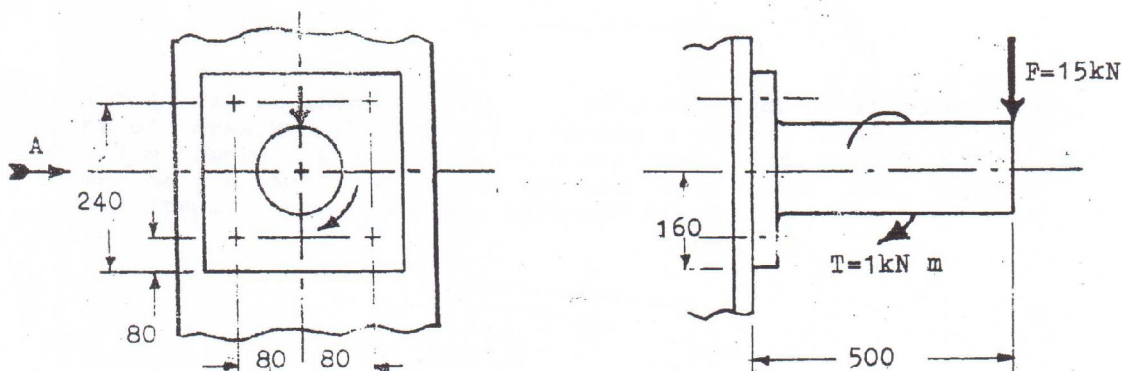
SHEET (2)

BOLTS

(1) Four M10 bolts are used to secure the bracket shown in Fig. in position to a wall. The bolts are made of steel having a yield strength of 620 MPa. Determine the least factor of safety for the bolts.



(2) The member shown in Fig. is bolted to a stanchion by means of four M8 through bolts made of Nickel steel having a yield strength of 620 MPa. Determine a. the least factor of safety for bolts b. the torque required to produce the necessary initial tightening. Suggest a method for taking up the shear loading on bolts due to the force F and torque T .



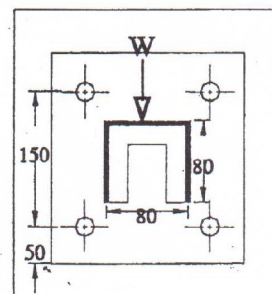
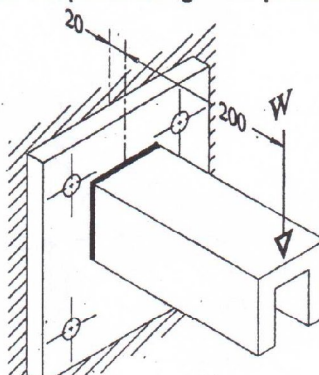
(3) The bar shown in figure is subjected to a 3 kN vertical load. The bar is fixed to a vertical plate by an inverted U shape welding. The plate is fixed to the wall using Four bolts. Calculate

a- The size of the weld.

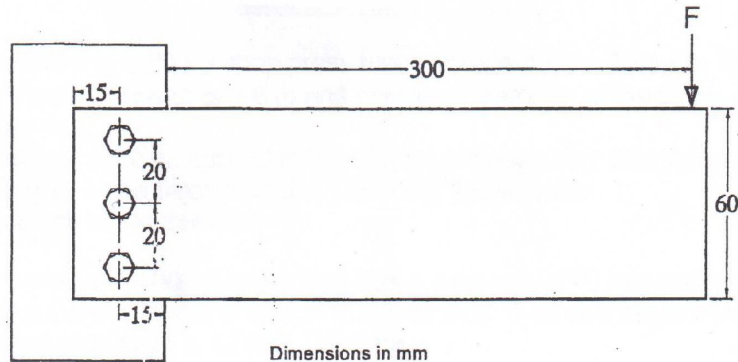
Take the weld strength
 $S_y = 300 \text{ MPa}$ & use a
 factor of safety of 3.5

b- The bolt diameter.

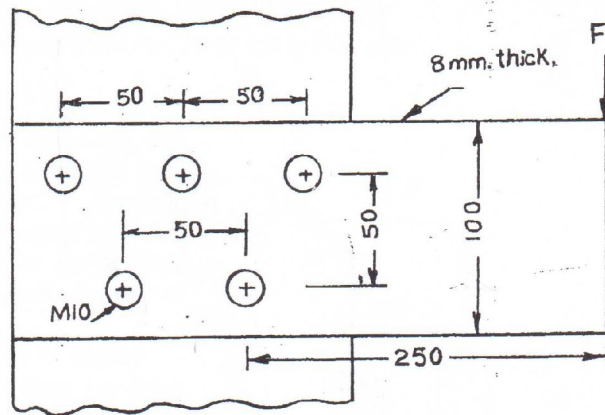
Take the bolt strength
 $S_y = 320 \text{ MPa}$ & use a



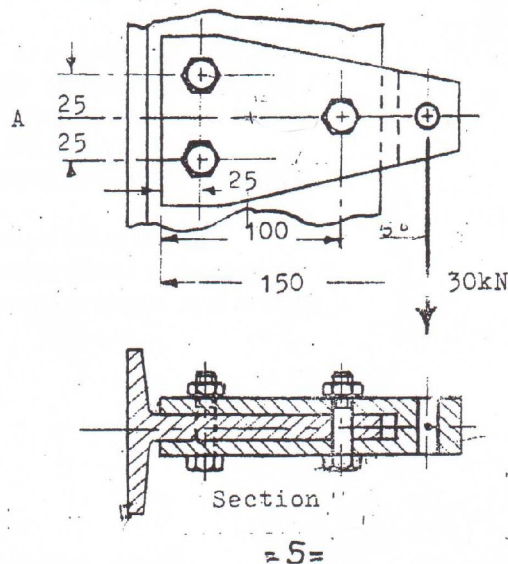
- 4) Find the maximum safe value of the concentrated load F for the bracket shown in figure, if the allowable shear stress for the three 6 mm through bolts is 150 MPa.



- 5) Determine the maximum force F that can be applied to the cantilever shown in the figure if the factor of safety is to be at least 2.8. The yield strength for the member is 500 MPa, and the yield strength for the bolts is 460 MPa.



- 6) The bracket shown in Fig. is secured to a 'T' column by means of three M10 through bolts having a yield strength of 620 MPa. The bracket is subjected to a vertical load of 30 kN. Determine the factor of safety for the bolts using the maximum-shear-stress theory. Neglect stresses due to initial tension in bolts.



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