Design of Tension member:—

Step 1:- Calculate $A_{net} = \frac{P}{\sigma_{at}}$

$\frac{1000 \times 1.35}{1350}$

$\frac{1000 \times 40}{100}$ $\frac{4000}{}$

Step 2: Choose a suitable section from the table have gross area equal to 40% more than net area.

(i) for single angle $A_{gross} = 1.35$ to 1.5 times A_{net}

(ii) for double angle

same side of gusset plate $\div A_{gross} = 1.35\ A_{net}$

Either side of gusset plate: $A_{gross} = 1.25\ A_{net}$.

Step 3: Find actual A_{net} for section selected in step 2, by making deductions for rivet holes.

Step 4: if

If $A_{net\,act.} \gtrless A_{net}$ (Calculated in step 1)

than selected section is O.K.

if $A_{net\,act.} < A_{net}$ (Cal. in step 1)

than try a lighter section and repeat till a suitable section is obtained.

Step 5: check for slenderness ratio.-

$\lambda = \frac{l}{r_{min.}} = \frac{\text{eff. span}}{\text{radi. of gyration}} \not> 350.$

for earthquake & wind load

$\lambda \not> 350.$

Step 6: design end connections-

no. of rivet $n = \frac{P}{R} = \frac{\text{axial tension}}{\text{Rivet value}}$.

(Q4) A T. member in a roof truss is 1.75 m long and carries an axial load of 150 kN. design a suitable single unequal angle section for hand driven rivet assuming there are less than 20 mm

$f_y = 250 \Rightarrow \sigma_{at} = 150 \text{ N/mm}^2$

Sol Required $A_{net} = \frac{150 \times 10^3}{150} = 1000 \text{ mm}^2$

Choose A_g :

$= 1000 + \frac{1000 \times 40}{100}$

$= 1400 \text{ mm}^2$

$= 14 \text{ cm}^2$

Choose $90 \times 60 \times 10$ mm @ 11.0 kg/m

gross area $= 1401 \text{ mm}^2$

Let it is connected using rivet 20 mm dia so

$x = 21.5$

$A_{net} = A_1 + kA_2$

$A_1 = 1635 \quad A_2 = ?$ $\quad k = 0.776$

$A_{net} = 1061.7 \text{ mm}^2$