

## shear stress due to force

قوة الشد  
الجزء الأول  
للمساحة

$$q = \frac{Q s}{I b}$$

عرض القطاع الفعال

$$q_x = \frac{Q_x}{I_y} \cdot \frac{s}{b}$$

$$q_y = \frac{Q_y}{I_x} \cdot \frac{s}{b}$$

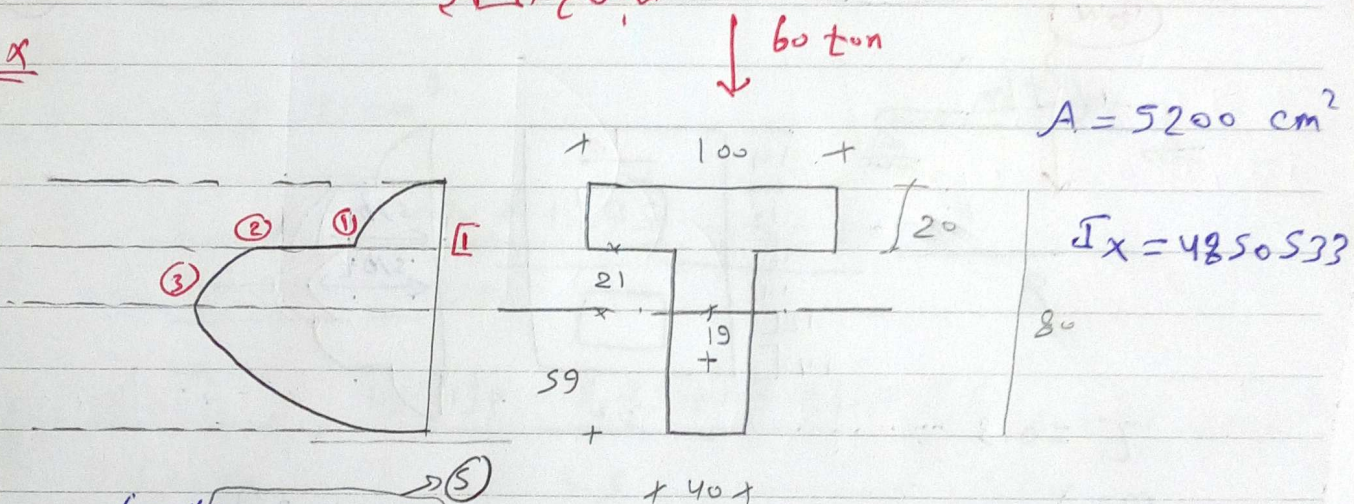
- حساب  $q$  في :-
- ① البداية والنهاية
  - ②  $q$  و  $c.g$
  - ③ عند حدود تغير في العرض

$$q = \left[ \frac{Q}{I} \right] \cdot \left( \frac{s}{b} \right)$$

متغير

ثابت في السائل

ex



$$q_1 = \frac{60 \times 100 \times 20 \times 31}{I_x \times 100} = 0.0077 \text{ t/cm}^2$$

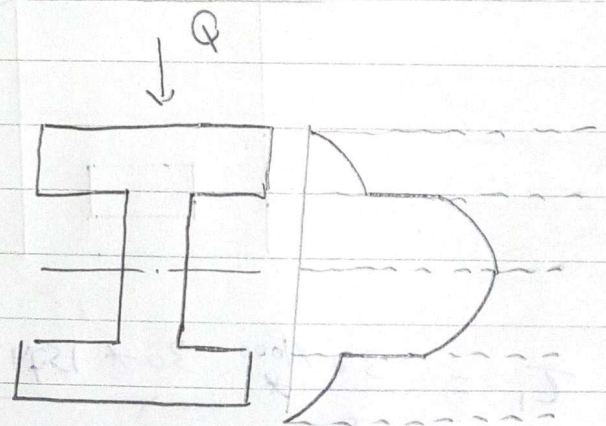
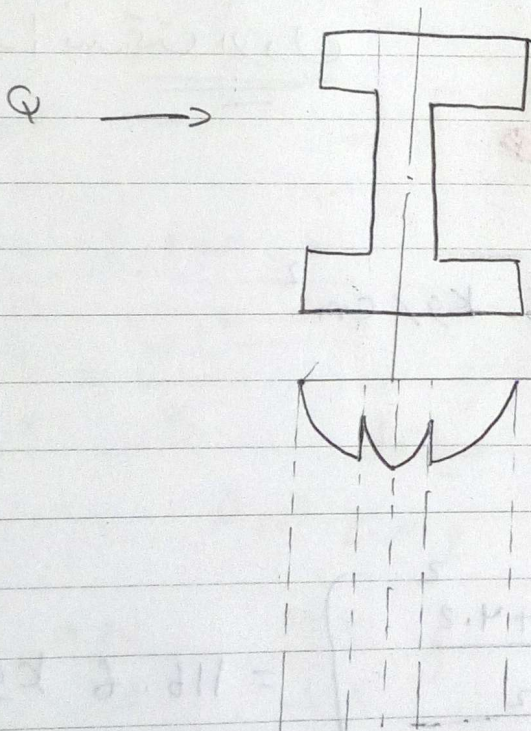
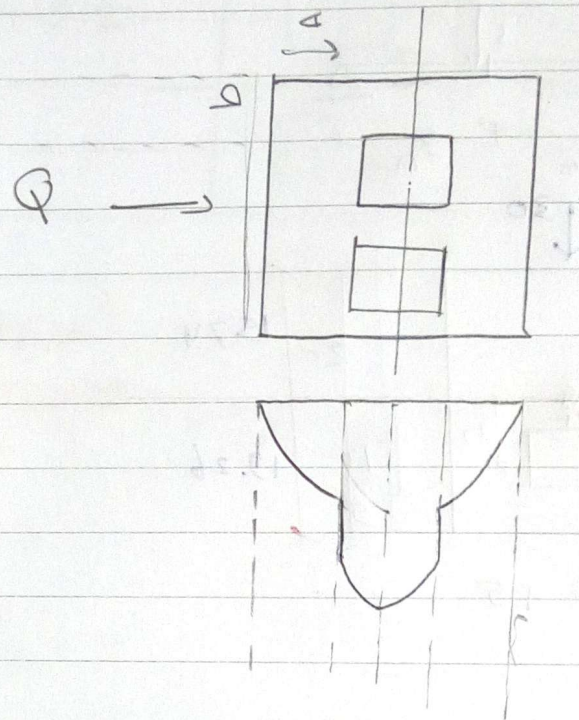
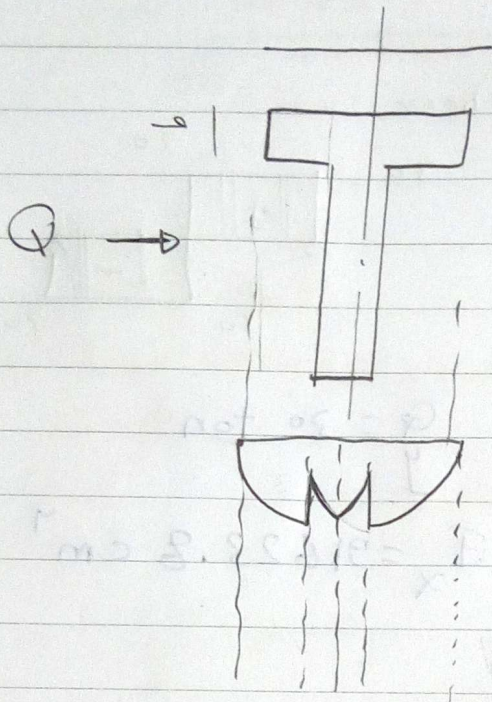
$$q_2 = \frac{60 \times 100 \times 20 \times 31}{I_x \times 40} = 0.019 \text{ t/cm}^2$$

$$q_3 = \frac{60 \times (100 \times 20 + 21 \times 40) \times 10.5}{I_x \times 40} = 0.02 \text{ t/cm}^2$$

المساحة  $c.g$

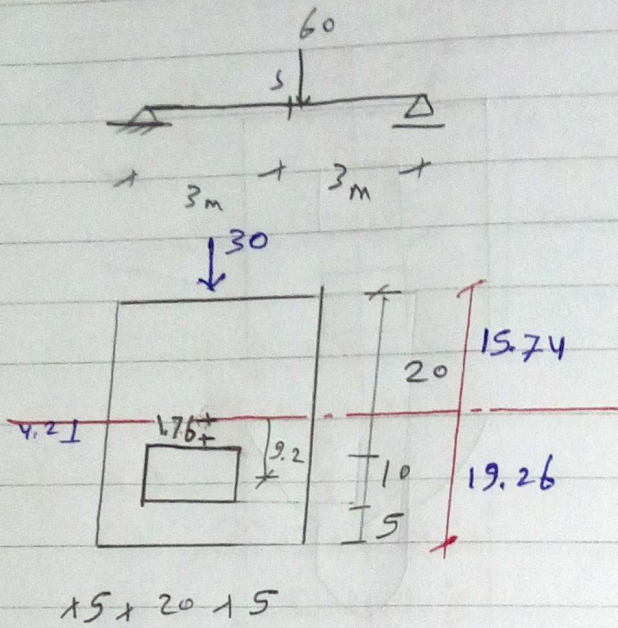


sketch

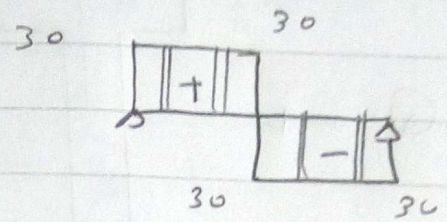




★ for the shown beam, Draw the shear stress



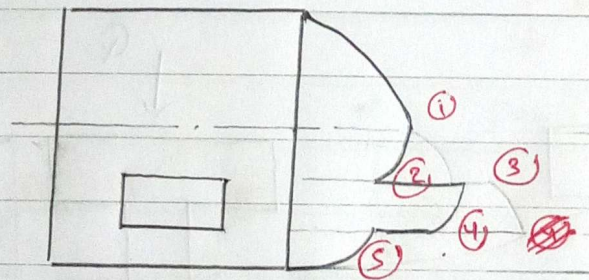
1) shear



$$Q = 30 \text{ ton}$$

y

$$I_x = 91623.8 \text{ cm}^4$$



لوقا بلك ما جندى  
ابدأ من تحت الود

$$\tau_1 = \frac{30 \times 1000}{I} \times \frac{30 \times 15.74^2}{2 \times 30} = 40.56 \text{ Kg/cm}^2$$

$$\tau_2 = 37.54 \text{ Kg/cm}^2$$

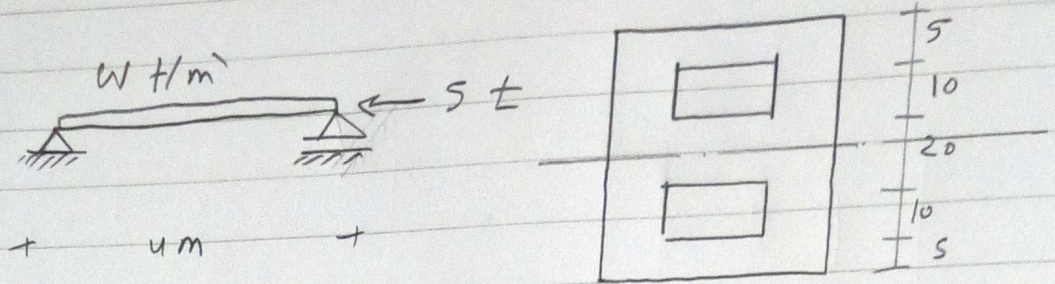
$$\tau_3 = \frac{30 \times 1000}{I} \times \left[ \frac{\left( \frac{30 \times 15.74^2}{2} \right)}{10} - \frac{30 \times 4.2^2}{2} \right] = 116.6 \text{ Kg/cm}^2$$

$$\tau_5 = 27.73$$

$$\tau_4 = 62.3$$



ex



Find  $w$  such that

\* Max shear stress =  $0.9 \text{ t/cm}^2$

$\left\{ \begin{array}{l} \text{Comp.} = 2 \text{ t/cm}^2 \\ \text{ten.} = 1 \text{ t/cm}^2 \end{array} \right\}$  Normal stress

$$t_1 = \frac{2w}{I} * \frac{5}{10} \quad w = \checkmark$$

$$t_2 = \frac{2w}{I} * \frac{52}{30} \quad w = \checkmark$$

$$N = -5 \text{ ton}$$

$$M = \frac{wL^2}{8} = -2w$$

في الربع الاول

$$M_x \equiv M$$

$$\sigma = \frac{N}{A} + \frac{Mx}{Ix}$$

$$= -\square - \square y$$

-2

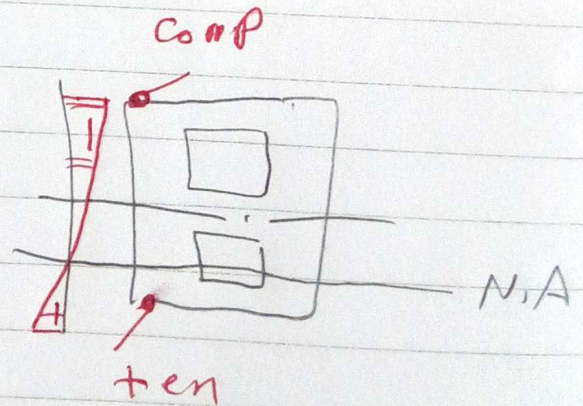
$$\sigma = -\square - \square * 25$$

+1 Com

$$\sigma = -\square - \square * -25$$

ten

قوة الشد



Hi . Star