I·D = 16757

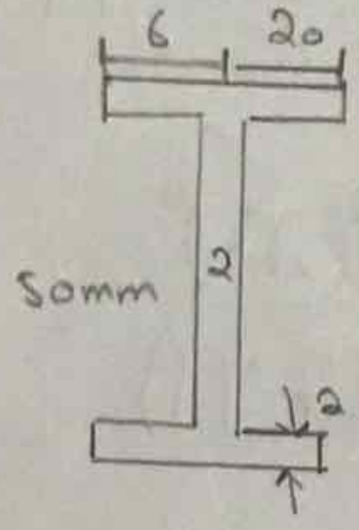
NAME = SULEMAN HAKEEM

Sec = B

# PAPAR = MOS - II

Q. 1

part (a)




**Required :-**

Location of shear center = ?

**Solution :-**

As we know that

$$e = \frac{t_f h^2 b^2}{4I}$$

and therefore.

$$I = 2\left(\frac{bh^3}{12} + Ay^2\right) + \left(\frac{bh^3}{12} + Ay^2\right)$$

$$= 2\left[\frac{26(2)^3}{12} + (20\times2)(25)^2\right] + \left[\frac{2(50)^3}{12} + 0\right]$$

$$I = 50034.66 + 20833$$

$$I = 70867.99 \text{ mm}^4$$

$$e = \frac{2(50)^2(25)^2}{4(70867.99)} = 11.02\text{mm}$$

So Shear center :

$$e = 11.02\text{mm}.$$

# Question 1

## Part (b)

**GIVEN :-**

$$\sigma^t = 6000 \text{ psi}$$

$$\text{height} = 26 \text{ ft}$$

$$\gamma = 62.41 \text{ lb/ft}^3$$

**REQUIRED :-**

$\text{Stress} = T = ?$

**SOLUTION :-**

As we knowthat

$$P = \gamma h$$

$$\sigma^t = \frac{PD}{2t}$$

So it becomes

$$t = \frac{PD}{2\sigma^t}$$

$$t = \frac{62.41 \times 26 \times 22}{2 \times 6000}$$

④ $t = 2.974$ Ans

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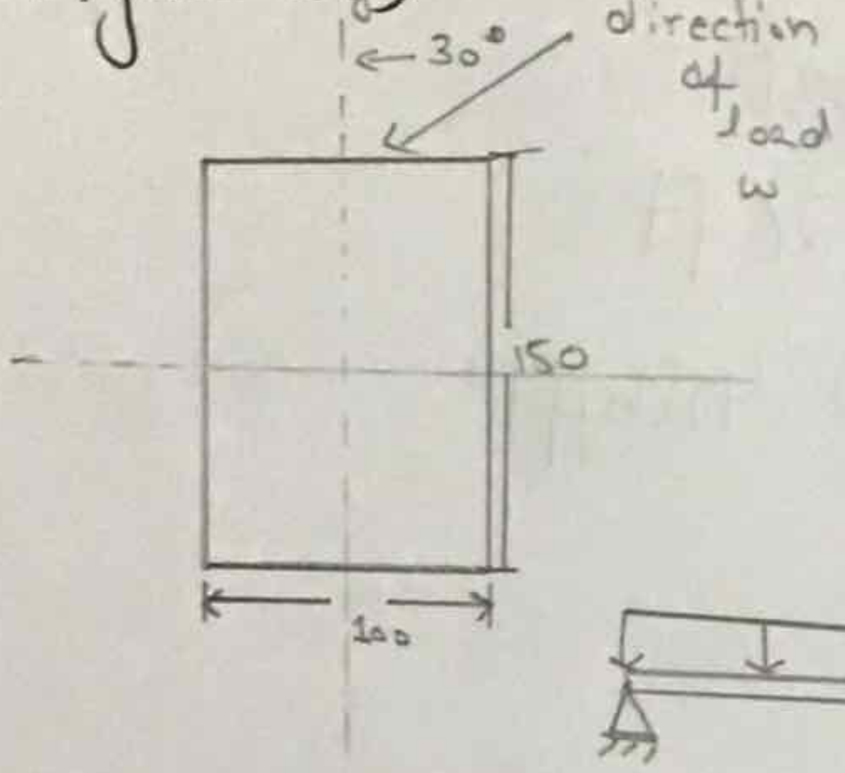
① 2 part (a)

Figure (2)




**Sol:-**

Max bending moment will be at top and bottom of Section and is equal to

$$\delta = \frac{MY}{I}$$

for

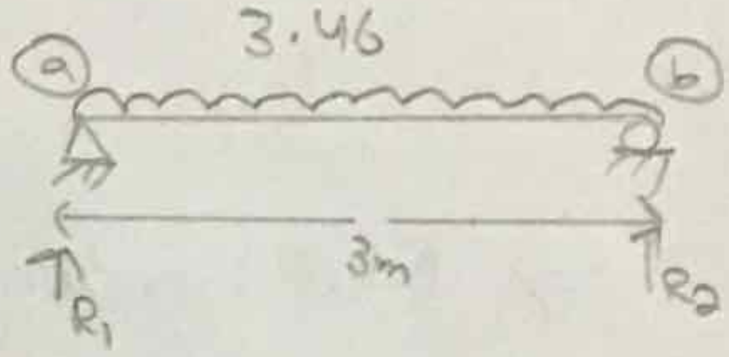
max

$y = C$

$$\delta_{mix} = \frac{MC}{I}$$

The Component of load that will creat bending is $4 \cos 30^\circ = 3.46$ KN/m

$\Rightarrow$ Total load $= 3.46 \times 3 = 10.39$ KN at Mid.




$\sum M_{(A)} = 0$

$R_2 \times 3 - 10.39 \times 1.5 = 0$

$R_2 = 5.19$

Also

$R_1 + R_2 = 10.39$

So

$\Rightarrow R_1 = 5.19$ KN.

Max moment will be at mid because it is simple span So.




$M_{max} = 5.19 \times 1.5$

$-3.46 \times 1.5 \times 0.75$

$M_{max} = 3.89$ KN-m.

(6)

for maxim bending stress

$C = 75mm = 0.075m$

$$I = \frac{bh^3}{12} = \frac{0.1 \times .15^3}{12}$$

$$= 2.8125 \times 10^{-5} m.$$

$\Rightarrow$ Max bending stress :-

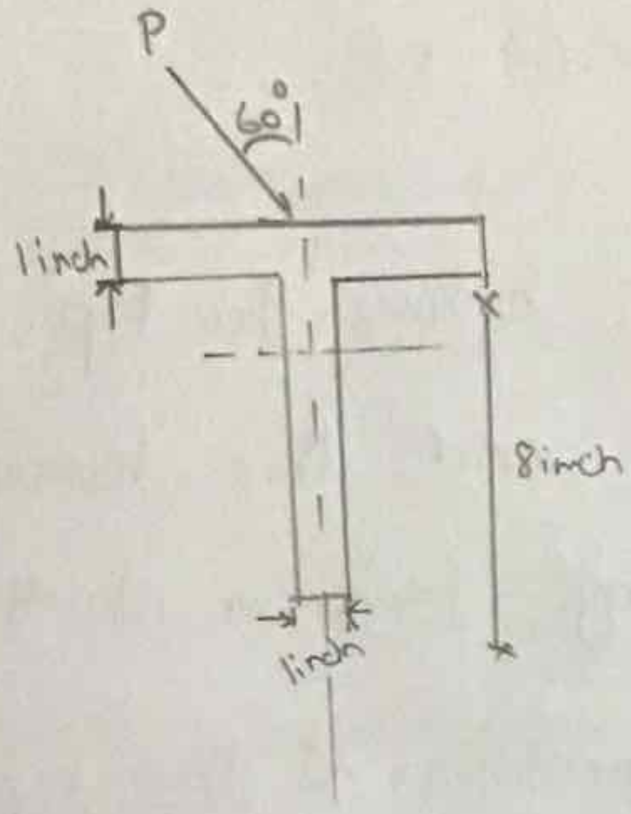
$$\frac{Mm \times C}{I}$$

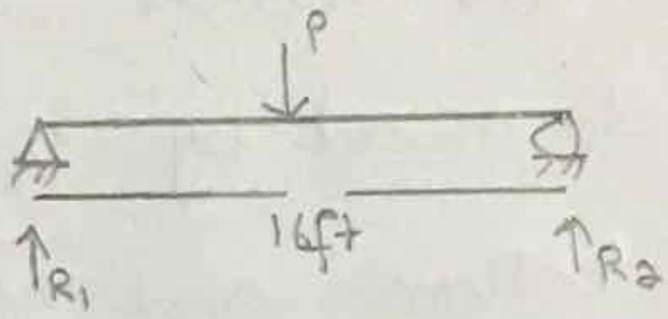
$$= \frac{3.89\ KN\text{-}m \times 0.075\ m}{2.8125 \times 10^{-5}}$$

$= 10373.33.$

Q 2 part (b)

Figure =




$I_x = 112.6 in^4$

$I_y = 18.7 in^4$.

Compressive strength = 12000psi

Tensile strength = 5000psi

The component of load that that will creat bending is $P\cos 60°$.

So $R_1 = P/2 \cos 60°$

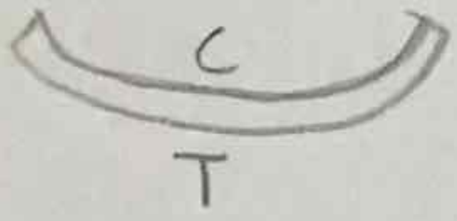
$R_1 = P/2 \cos 60°$

(8) Maximam moment will be at mid because of Simple Supported beam so.

$$M_{max} = \frac{P}{2} \cos 60^\circ \times 8$$

Centroid 3.07 m below the top.

This moment will bend the beam downword by creating tension at the bottom and Compression at the top.




=> for compression

use $C = 3.07$.

for tension

use = $C = 9 - 3.07$

$= 5.93$ in.

$I_x = 112.6 \text{ in}^4$

So for allowable load for compression

$$\text{stress} = \frac{M_{max} \times C}{I_x}$$

$$12000 \frac{lb}{in^2} = \frac{P/2 \times \cos 60 \times 8 \times 12 \times 3.07}{112.6}$$

$$P = 18338.71 lb$$

for tension

$$5000 = \frac{P/2 \times \cos 60 \times 8 \times 12 \times 5.93}{112.6}$$

$$\boxed{P = 3955.8 lb}$$

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Q No = 3

Given Data :-

1) Load = P = ?
2) Safe load = P = ? F.S = 2
3) Dimensions = 0.75" by 2"
4) Length = 10' = 120"
5) $E = 10.3 \times 10^6$

Solution :-

$$P = \frac{2\pi^2 E I}{L^2} \qquad I = \frac{bh^3}{12}$$

$$P = \frac{20.25 \times 10.3 \times 10^6 \times \frac{1}{3}}{(120)^2} \qquad I = 0.\frac{5 \times 2^3}{12}$$

$$I = 0.\frac{5 \times 6}{12}$$

$$I = \frac{1}{3}$$

$$P = 4828.125$$

$$F.S = 2$$

$$P_{allowable} = \frac{4828.125}{2}$$

$$= 2414.625 \quad \text{Ans.}$$