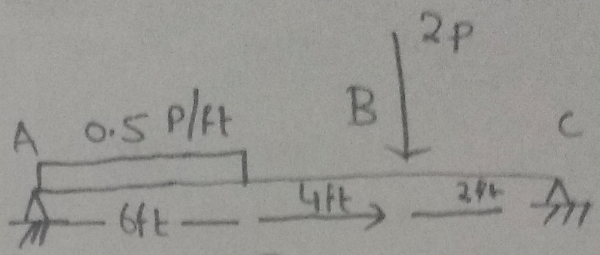
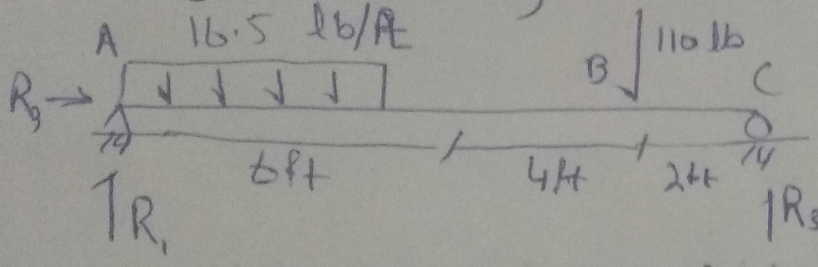
ID	7655
Subject	M.O.S 2
Submitted by	Syed USAMA
Submitted to	Engineer Sagib
Date	18/4/2020

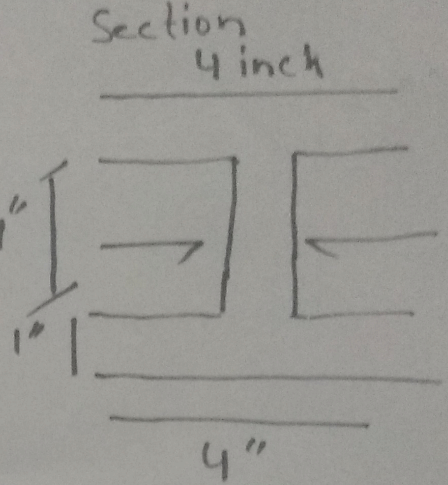
Sol) Given



Note put the value of P = 55

So we have;





To find the unknown reaction at the support,

Apply equilibrium equation

$\rightarrow \Sigma F_x = 0$, $R_3 = 0$ $\quad \overset{+}{\rightarrow}$

$\uparrow \Sigma F_y = 0$

$\uparrow R_1 + R_2 = 99 + 110 = 209$ — (1)

Next $\Sigma M_A = 0$ $\quad \circlearrowleft +$

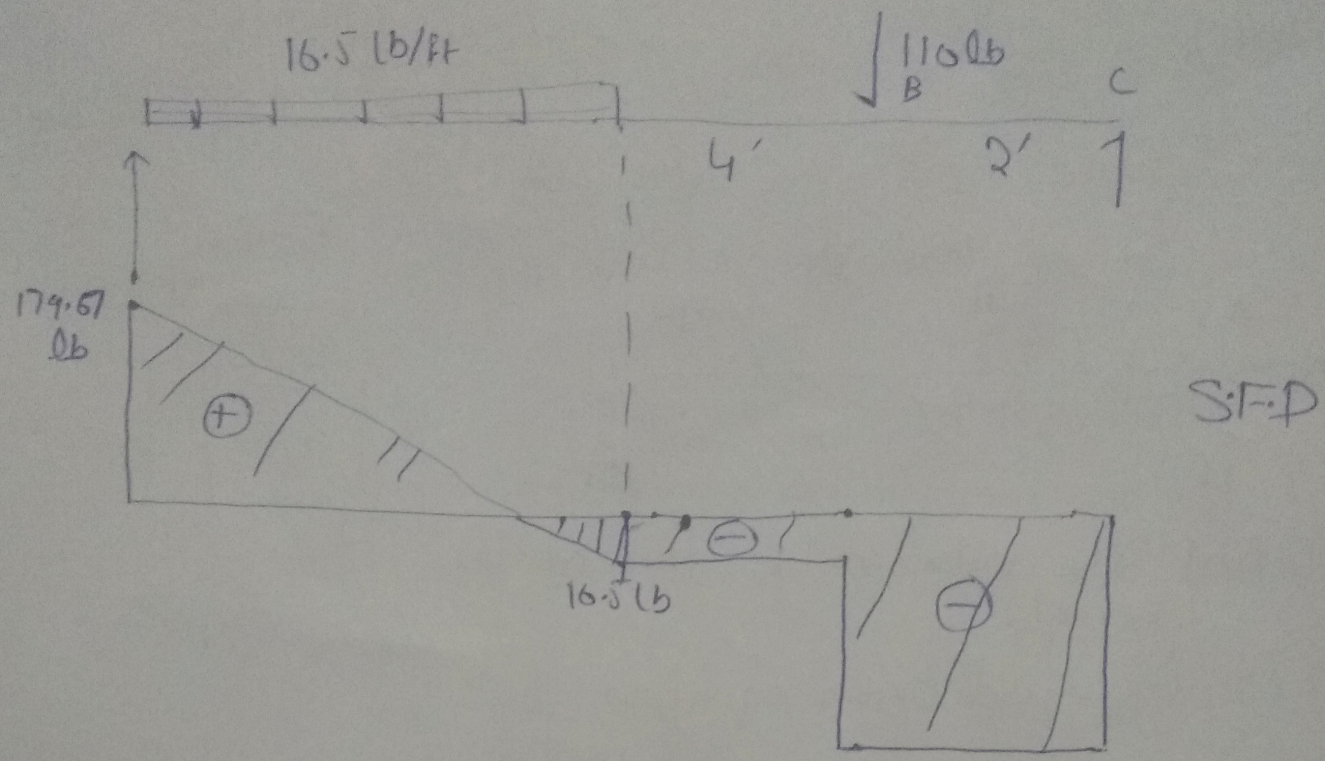
$\uparrow R_2 \times 12 - 10 \times 110 - (16.5 \times 6) \times 3 = 0$

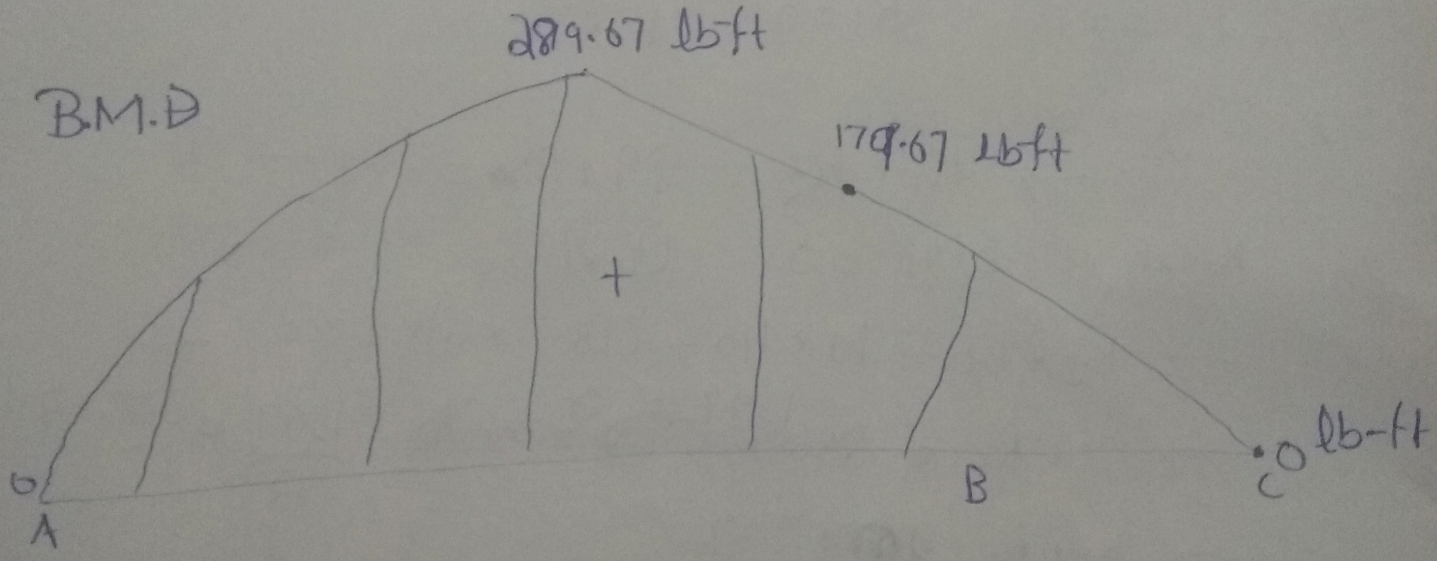
$\uparrow 12 R_2 = 1397 = 0$ $= \frac{1397}{12} = 388.67$ lb

$\uparrow R_1 + R_2 = 209$

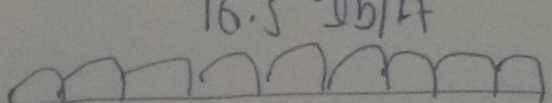
$\uparrow R_1 = -209 + 388.67 = +179.67$

Now Draw shear force and bending Moment dia





O Now Shear force of change point of beam



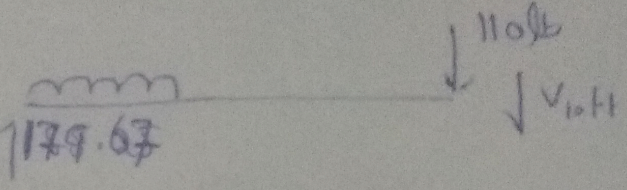
Shear force at 6ft from left support

$$179.67 - 16.5 \times 6 - V_{6ft} = 0$$

$$V_{6ft} = 80 \text{ lb}$$

Now shear force at 10ft

$\Sigma f_y = 0$ +↑



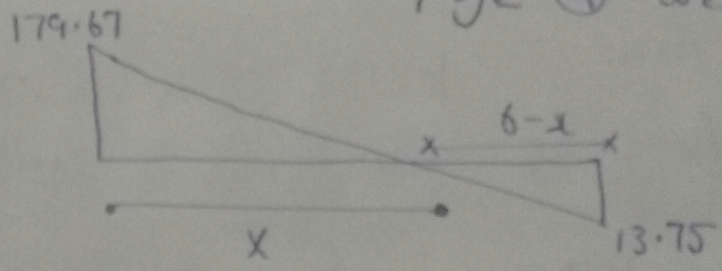
$$179.67 - 16.5 \times 6 - 110 - V_{10ft} = 0$$

$$V_{10ft} = 29.33 \text{ lb}$$

- Point of max boundry movement

as we know that the point where shear force is min the bending movement is max so from Point of zero shear corresponding point will have max bending movment.

From shear force dia on page ② we have



we know

$$\frac{179.67}{x} = \frac{13.75}{6-x}$$

$$x/(6-x) = \frac{13.75}{179}$$

$$x = 5.166 \text{ ft}$$

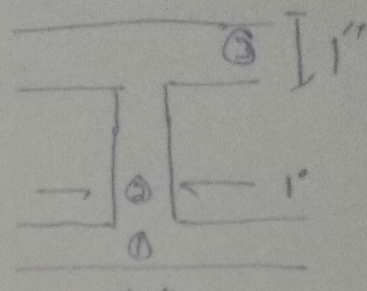
Now determin the value of movement at 5.166 ft

$$M_{5.166\,ft} - 440.40(5 + 215.50 = 0$$

$$M_{5.166} = 224.899 \text{ lb ft}$$

For shear stress we have (4) $\tau = \frac{VQ}{Ib}$

So 1st we deter movement of Inertia I from given section



As given figure is Symetrical along both the axis,

So $\bar{x} = 4/2 = 2$ in ; $\bar{y} = 6/2 = 3$ in

ie $(\bar{x}, \bar{y}) = (2,3)$ (center of gravity)

From extrem left and bottom

Area of Point ① = 4 in²

Area of point ② = 4 in²

Area of Point ③ = 4 in²

Movement of inertia about x axis (centroid)

→ Detering distance b/w C.G of the whole section find the corresponding parts

$k_1 = \bar{y} - \bar{y}_1 = 3 - 0.5 = 2.5$ in

$k_2 = \bar{y} - y_2 = 3 - 3 = 0$ in

$k_3 = \bar{y} - y_3 = 3 - 0.5 = 2.5$ in

$I_{xx} = 4/12 + 25 + 64/12 + 4/12 + 25$

$I_{xx} = 56$ in⁴

Now $I_{yy} = \frac{(4)^3(1)}{12} + \frac{(1)^3(4)}{12} + \frac{(4)^3(1)}{12} = 11$ in⁴