NAME :

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ID :

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SUBJECT :

STRUCTURE ANALYSIS I

SUBMITTED TO :

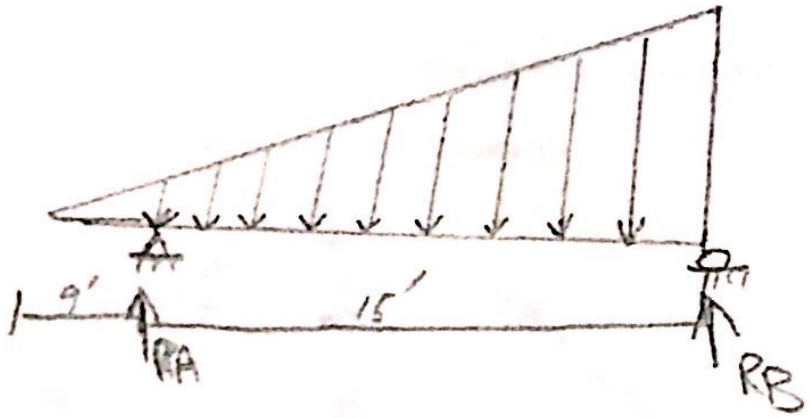
Engr. SAQIB KHAN

DATE :

26, SEPT 2020

QNo.1

P = 45 lb/ft



Sol:-

$$\Sigma F_y = 0 \quad \uparrow + \downarrow -$$

$$R_A + R_B - \frac{1}{2}(45)(24) = 0$$

$$R_A + R_B = 540 \quad \text{—— ①}$$

$$\Sigma M_A = 0 \quad \circlearrowleft + \circlearrowright -$$

$$-(R_B \times 15) + \left(\frac{1}{2}(45)(15)\right)\left(\frac{2}{3} \times 15\right) = 0$$

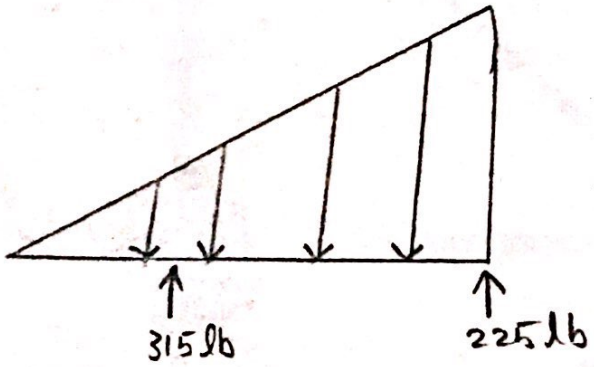
$$-15 R_B + 3375 = 0$$

$$+R_B = +\frac{3375}{15}$$

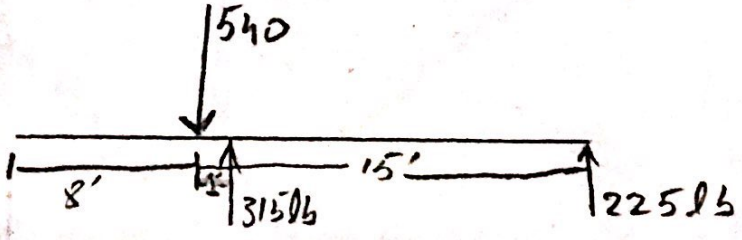
$$\boxed{R_B = 225 \text{ lb}}$$

Put in eq ① we get.

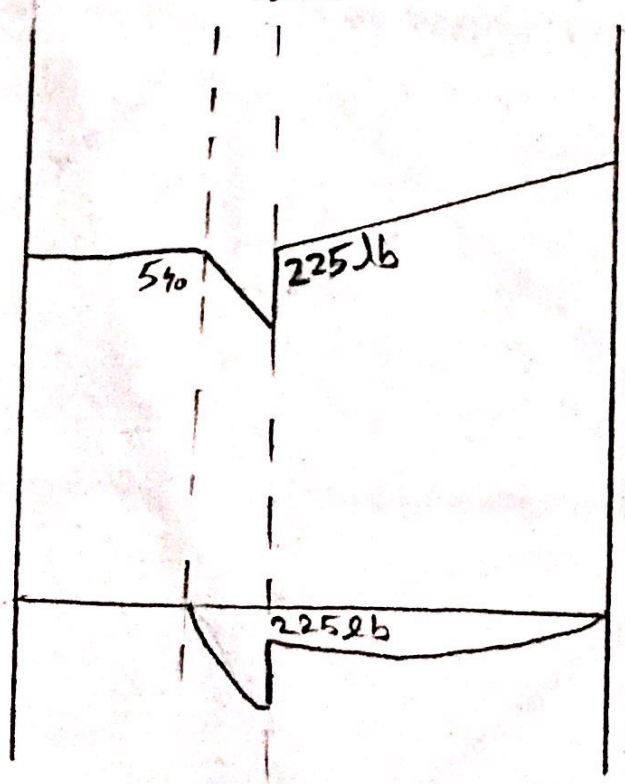
$$R_A = 315\ lb$$



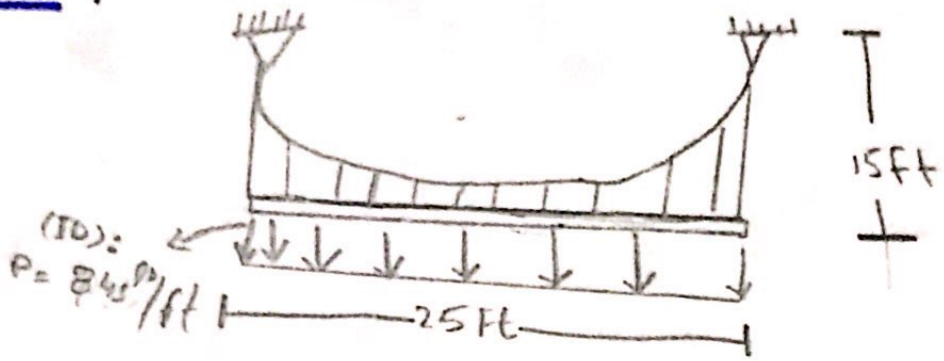
F.B.D



S.F.D



Qn. 2 :



Sol:

The cable support the uniform load of $w_a = 845$ lb/ft.

$$y = \frac{w_a}{2F_H} x^2$$

$$15 = \frac{845}{2F_H} x^2$$

$$10 = \frac{845}{2F_H} (25 - x)^2$$

$$\frac{845}{2(15)} x^2 = \frac{845}{2(10)} (25 - x)^2$$

$$\frac{x^2}{30} = \frac{1}{20} \{(25)^2 + (x)^2 - 2(25)(x)\}$$

$$\frac{x^2}{30} = \frac{1}{20}(625 + x^2 - 50x)$$

$$x^2 = \frac{30}{20}(625 + x^2 - 50x)$$

$$x^2 = 1.5(625 - 50x + x^2)$$

$$0.5x^2 - 75x + 937.50 = 0$$

$$\text{root} = 25$$

$$x = 13.76$$

$$F_{II} = \frac{845}{2(15)}(13.76)^2$$

$$= 53016$$

At B

$$y = \frac{w_o}{2y}x^2$$

$= 845 \quad x^2$

$= 2(5340)$

$dy = \tan\theta = 0.158x \Big|_{x=13.76=2.180}$

$\theta_B = 65.3°$

$T_B = \dfrac{I_x}{\cos\theta_B}$

$= \dfrac{5340}{\cos 65.3°}$

$= 13028 \text{ lb/ft}$

$= 13 \text{ kip}$

At Point A

$y = \dfrac{w_o}{2FH} \cdot x^2$

$$= \frac{845}{2(534o)} \cdot x^2$$

$$= \tan\theta/A = 0.158x \quad \Big| \; x = (25 - 13.76)$$

$$1.780$$

$$\theta A = 60.67^\circ$$

$$\overline{TA} = \frac{Fix}{\cos\theta A} = \frac{5340}{\cos 60.67^\circ}$$

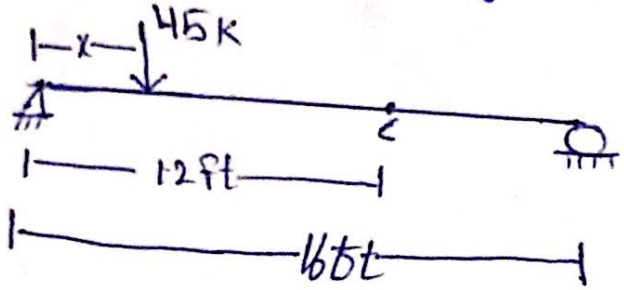
$$\overline{TA} = 10901.541.$$

$$\overline{TA} = 10.9 \text{ kip}$$

Q no #3

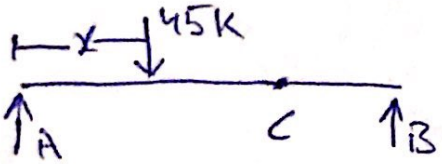
Shear force influnce for line

P = 45 K

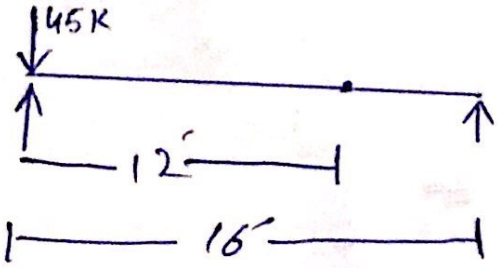


$x = 0$, $V_c = ?$

∴ Shear force changes with every different Position.



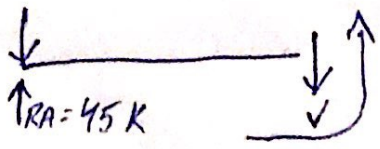
1 ⟹



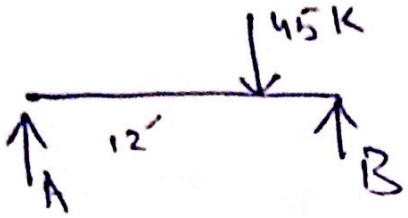
$\circlearrowright^{+} \Sigma M_B = 0$

$45 \times 16 - RA(16) = 0$

$\boxed{RA = 45}$



Now $x = 12$



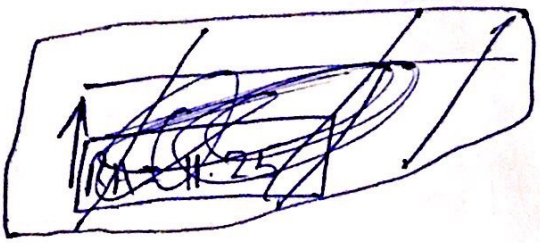
$\hookrightarrow \Sigma M_B = 0$

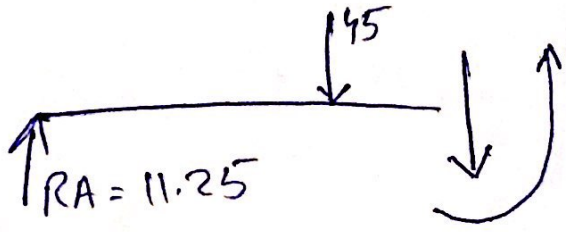
$$-RA \times 16 + 45(4) = 0$$

$$180 = 16\,RA$$

$$\frac{180}{16} = RA$$

$$\Rightarrow \boxed{RA = 11.25}$$

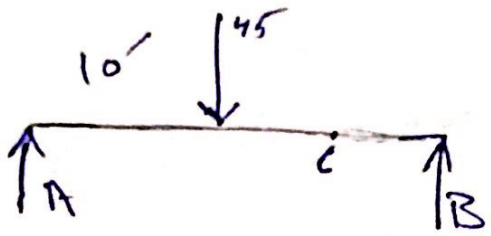




$$11.25 - 45 - Vc = 0$$

$$\boxed{Vc = -33.75}$$

Now $x = 10$

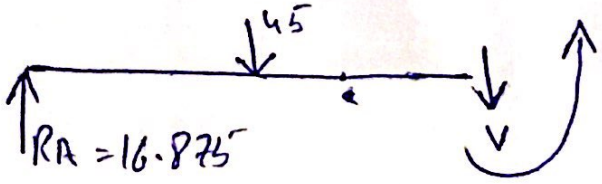


$V_C = ?$

$\left(+\circlearrowright\right) \Sigma M_{12} = 0$

$$-RA(16) + 45(6) = 0$$

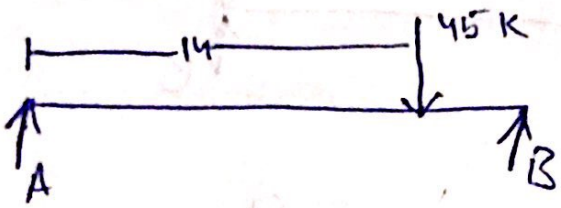
$$\boxed{RA = 16.875}$$



$$16.875 - 45 - V_C = 0$$

$$\boxed{V_C = -28.125}$$

x = 14

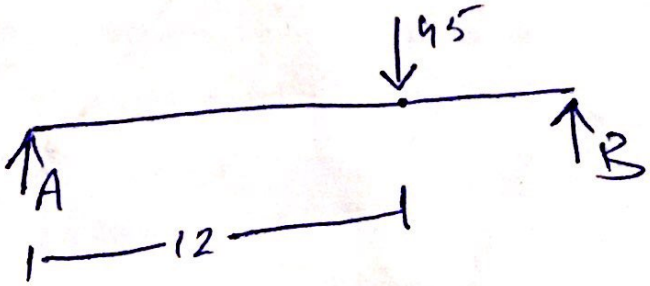


↳ $\Sigma M_B = 0$

$$-RA(16) + 45 \times (9) = 0$$

$$RA = 5.625$$

x = -12



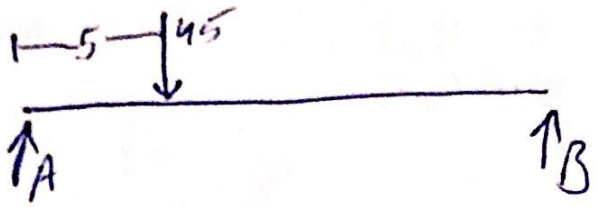
$$45(4) - RA(16) = 0$$

$$RA = 11.25$$

$11.25 - 45 - V_C = 0$

$$\boxed{V_C = -33.75}$$

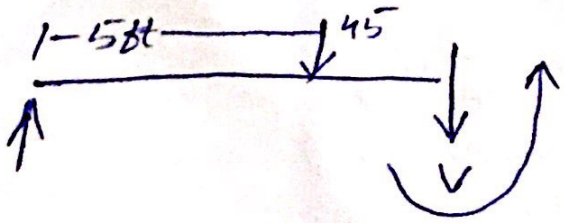
$x = 5$



$\circlearrowleft^{+} \Sigma M_B = 0$

$$-R_A(16) + 45(11) = 0$$

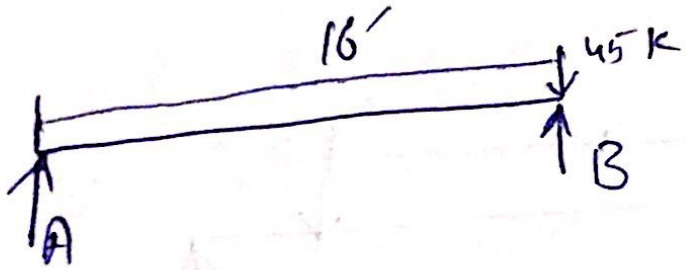
$$\boxed{R_A = 30.9375}$$



$$30.9375 - 45 - V_c = 0$$

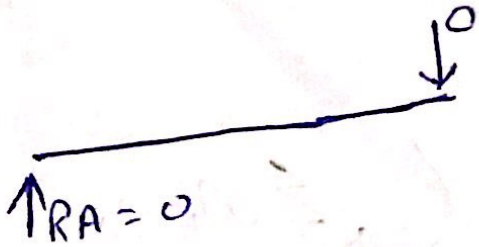
$$\boxed{V_c = -14.0625}$$

$x = 16$



$$-RA(16) + 45(0) = 0$$

$$\boxed{RA = 0}$$

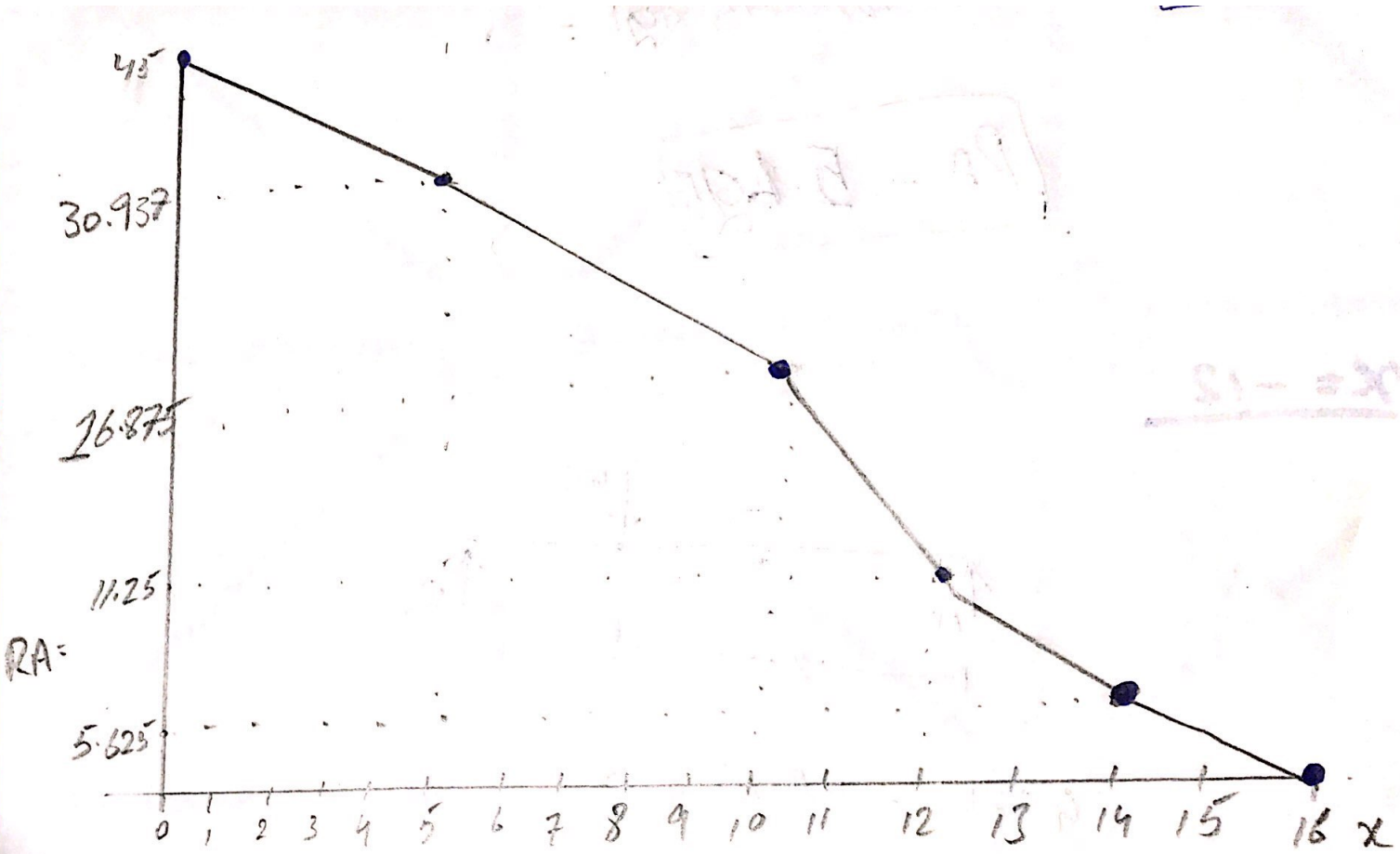


$RA = 0$

$$0 - Vc = 0$$

$$\boxed{\Rightarrow Vc = 0}$$

x	Vc
0	0
5	-14.0625
10	-28.125
12^-	-33.75
12^+	-33.75
14	5.625
16	0



Influence line of RA