NAME Qaiser Siddique.

ID 7863

SECTION B

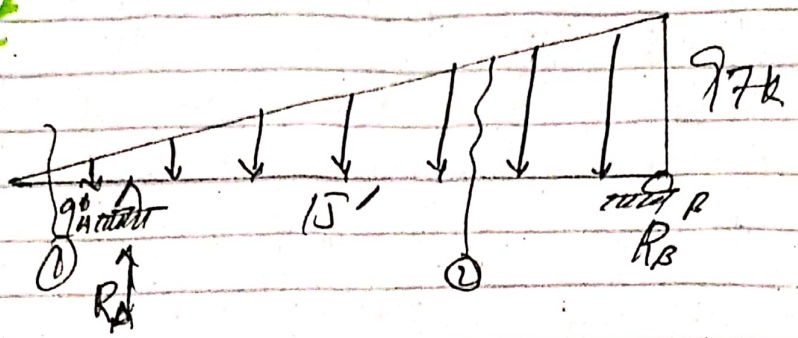
SUBJECT :- Structure Analysis I

SEMESTER :- "Summer"

SUBMITTED TO :-

"Engr. Saqib Khan"

Q No. 1



$\Sigma M_B = 0$ ↺

$\Rightarrow \frac{1}{2} \times 97 \times 24 \times \frac{1}{3} \times 24 = R_A \times 15$

$\Rightarrow R_A = 620.8$ lb

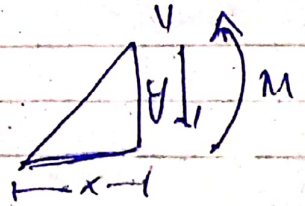
$\Sigma F_y = 0$ ↑

$R_A + R_B = \frac{1}{2} \times 97 \times 24$

$\Rightarrow R_B = 1164 - 620.8$

$R_B = 543.2$ lbs.

Now Section (1) — (2)



For y :-

$\frac{y}{x} = \frac{97}{24}$

$\Rightarrow y = \left(\frac{97}{24}\right)x.$

So, $\Sigma F_y = 0$ ↑+

$\Rightarrow -1/2 \times x \times (97/24)x - V_c = 0$

$\Rightarrow V_c = \frac{-97x^2}{48}$

at

$\Rightarrow x = 0.$

$V_c = 0$

& at $x = 9$

$V_c = -163.6875$ lb.

$\Rightarrow M = -1/2 \times x \times (97/24)x \times 1/3 x.$

$\Rightarrow M = -\frac{97x^3}{144}$

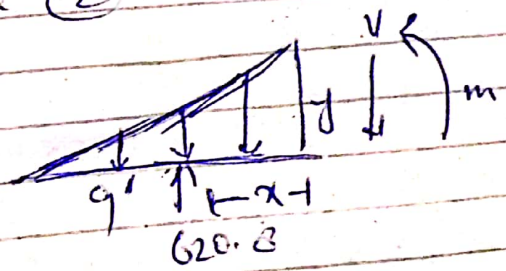
at $x = 0$

$M = 0$

$x = 9$

$M = -491.0625$ lbs.ft.

2) Now for section (2) – (2)



for y

$\frac{y}{x+9} = \frac{97}{24}$

$\Rightarrow y = \frac{97}{24}(x+9)$

So,

$\Sigma f_y = 0 \uparrow$

(4)

$$(20 - 8\cdot\tfrac{1}{2} \times (x+9)\left(\frac{97}{24}\right)(x+5) - V_c = 0$$

$$\Rightarrow V_c = 620.8 - \frac{97 \times (x+5)^2}{48}$$

at

$x = 0$

$V = 457.112$ ↓

at

$x = 15$

$V = -543.2$ K

$$M + \frac{1}{2} \times (x+9)\left(\frac{97}{24}\right)(x+6) \times \frac{1}{3} \times (x+9) - 620.2x = 0$$

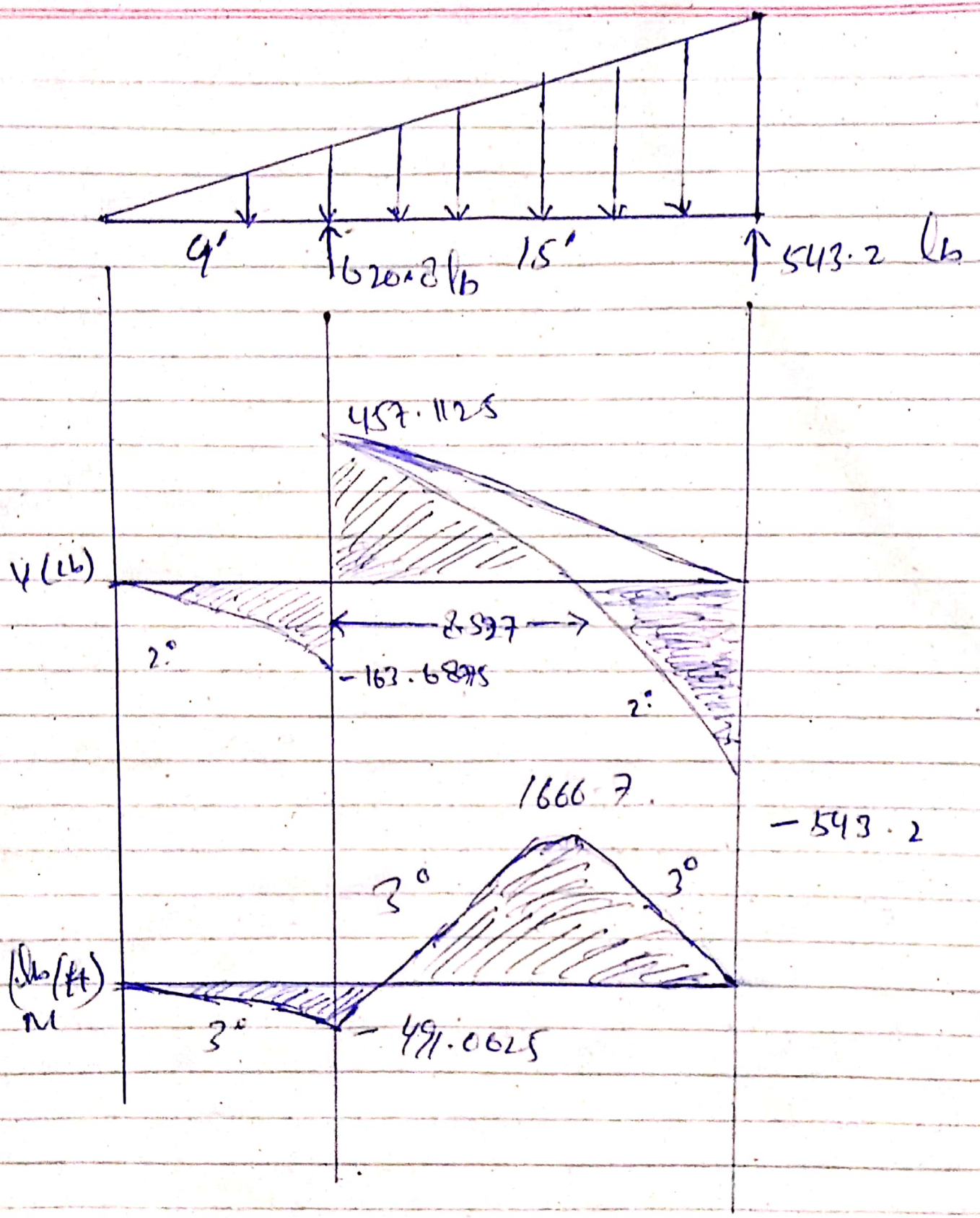
$$\Rightarrow M = 620.8x - \frac{97(x+9)^3}{144}$$

at $x = 0$

at $x = 15$

$M = 0$

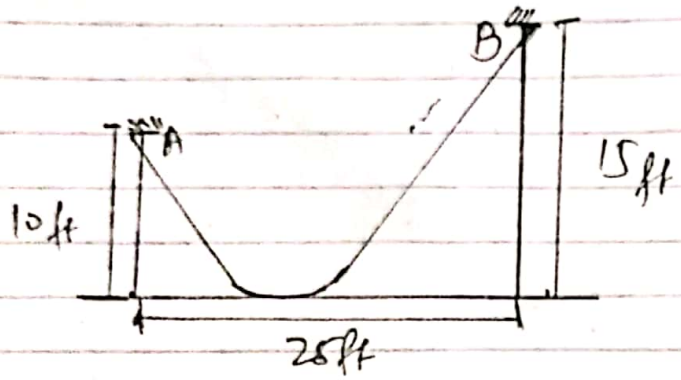
(5)



Q NO.2

ID - 7863

Solution :-



⇒ Capable Support Uniform load = 863 lb/ft

⇒ Determine the tension in cable at,

Support A = ?

Suppor B = ?

Solution:

$$Y = \frac{W_0}{2FH} x^2$$

By putting values.

$$15 = \frac{863}{2FH} x^2 \quad \text{—(1)}$$

$$110 = \frac{863}{2FH} (25-x)^2 \quad \text{—(2)}$$

⇒ By solving Both eq:.

$$F_H = \frac{863}{2(15)} x^2 \quad , \quad F_H = \frac{863}{2(10)} (25-x)^2$$

Now $F_H = F_H$.

$$\frac{863}{2(15)} x^2 = \frac{863}{2(10)} (25-x)$$

$$24.86 x^2 = \frac{37.3 (625 - 50x + x^2)}{24.86}$$

$$x^2 = 1.500 (625 - 50x + x^2)$$

$$0.5 x^2 - 75x + 937.50 = 0 \quad — (1).$$

⇒ Now choose root < 25 ft.

By solving eq (1).

$$x = 13.76 \text{ ft}$$

As, ⇒ Now :-

$$25 - 13.76 = 11.25 \text{ ft}.$$

$$F_H = \frac{863}{2(15)} x^2 = \frac{863}{30} (13.76)^2.$$

$$F_H = 4708 \text{ lb} \quad — (A).$$

$$F_H = \frac{863}{2(10)} (25-x)^2 = \frac{863}{20} (11.25)^2$$

$$F_H = 4720 \text{ lb} \quad — (B)$$

⇒ Support -B

$$y = \frac{wlo}{2F_H} x^2 = \frac{863}{2(4708)} x^2$$

$$\frac{dy}{dx} = \tan\theta_B = 0.079(x)^2$$

$$= 0.079(13.76)$$

$$= 1.089$$

We have,

$$\tan\theta_B = 1.089$$

$$\theta_B = \tan^{-1}(1.089)$$

$$\theta_B = 47.439°$$

⇒ Tension at B :-

$$T_B = \frac{F_H}{\cos\theta_B} = \frac{4703}{\cos(47.439)} = 6953.24 \text{ lb}$$

$$= 6.95 \text{ kips}$$

⇒ Support -A :-

$$\frac{y = wlo}{2F_H} x^2 = \frac{863}{24708} (11.25)^2$$

$$y = 10.027$$

$$\frac{dy}{dx} = \tan\theta_A = 10.027$$

(9)

$$\theta_A = \tan^{-1}(10.027)$$

$$\theta_A = 84.304^\circ$$

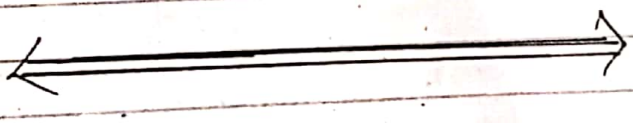
Now;

$$T_A = \frac{F_H}{\cos\theta_A}$$

$$T_A = \frac{4708}{\cos(84.304)}$$

$$T_A = 47435.63 \text{ Lb.}$$

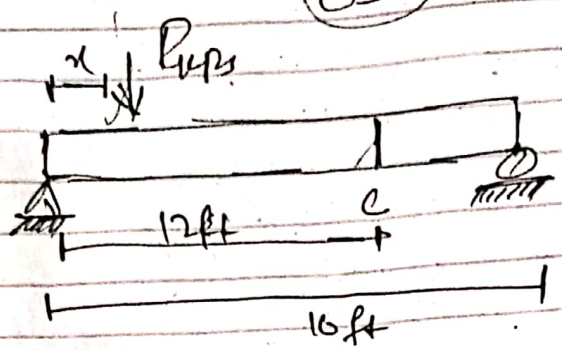
$$\boxed{T_A = 47.43 \text{ kips.}}$$



(1C)

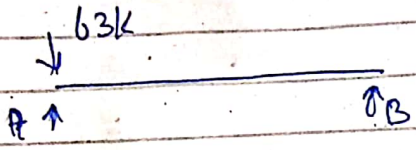
(63)

Q3



Influence line for R_A

For $x = 0$ $\quad R_A = ?$



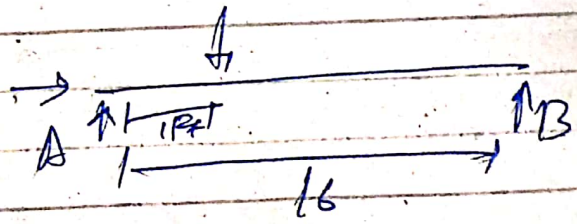
$\Rightarrow$

$\circlearrowleft \Sigma M_B = 0.$

$(63 \times 16) - R_A(16) = 0.$

$\frac{1008}{16} = R_A \Rightarrow \boxed{R_A = 63}$

for $x = 1\,ft$ $\quad R_A = ?$



$\circlearrowleft \Sigma M_B = 0$

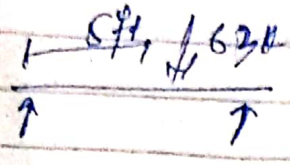
$(63 \times 15) - R_A(16) = 0$

$R_A = 59.0625$

(11)

for

$x = 5$ $\quad R_A = ?$

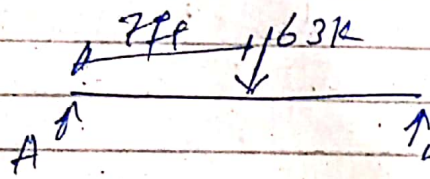


$\curvearrowleft \Sigma M_B$

$(63 \times 5) - R_A(16) = 0$.

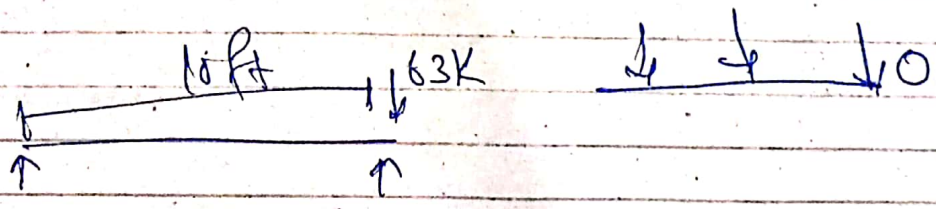
$R_A = 19.68$ k

But $x = 7$, $R_A = ?$



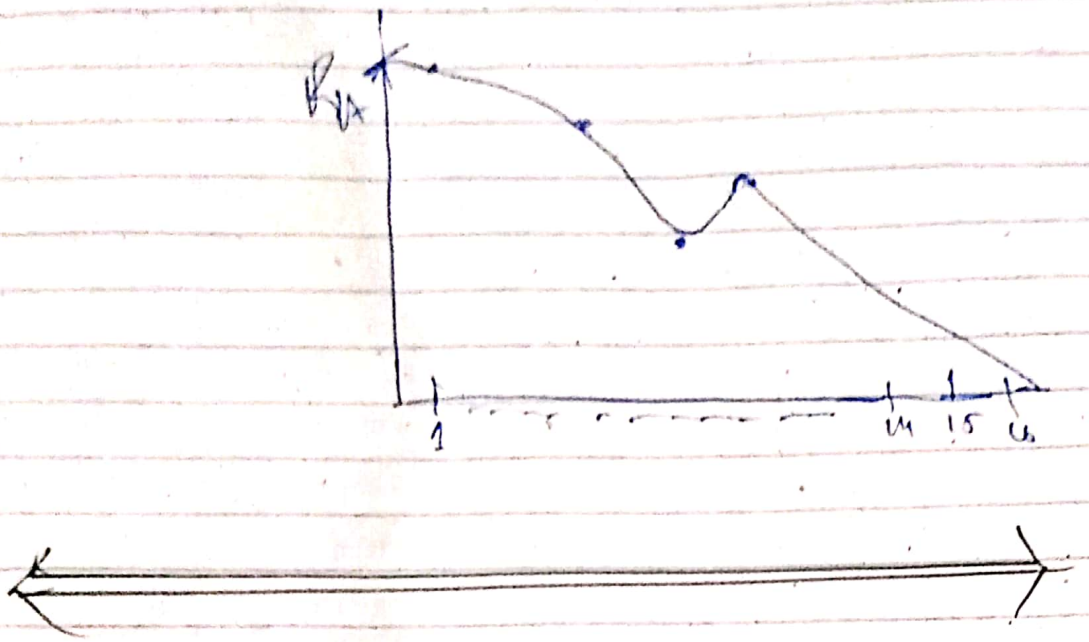
$\curvearrowleft \Sigma M_B \quad (63 \times 7) - R_A(16) = 0$

$R_A = 27.56$



$-R_A(16) + 63(0) = 0$.

$R_A = 0$.



THE

END.