

Name = Atif ali

ID # 7886

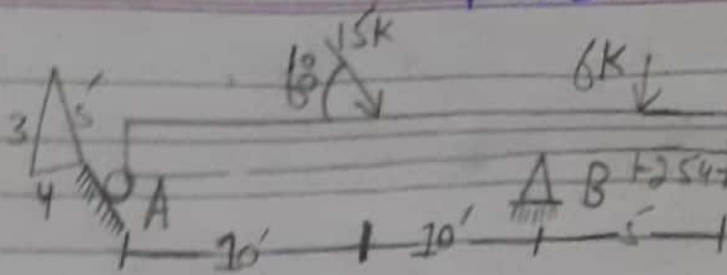
Subject: Structure

Analysis-I

Submitted to: Sir Saqib

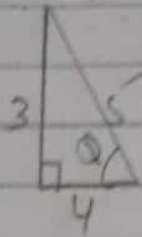
P#1

Q (1)



Solution:-

We have to find the angle for the roller support first.



: Using trigonometry

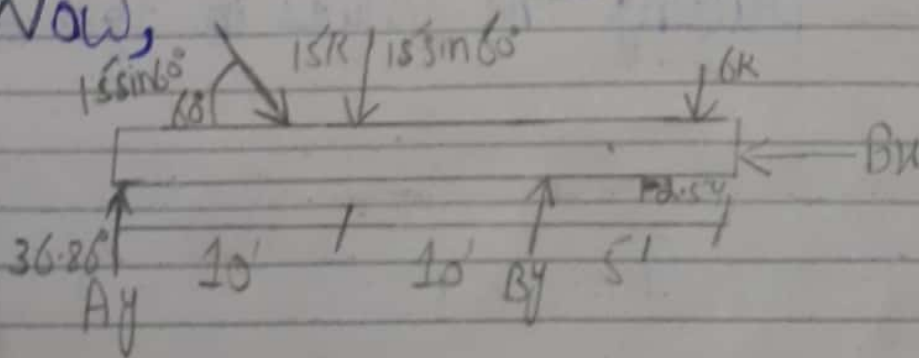
$$\sin \alpha = \frac{P}{H}$$

$$\sin \alpha = \frac{3}{5}$$

$$\alpha = \sin^{-1}\left(\frac{3}{5}\right)$$

$$\alpha = 36.86^\circ$$

Now,



1) $\sum F_x = 0 \rightarrow \leftarrow$

$$15 \cos 60^\circ - B_x - A_y \sin 36.86^\circ = 0$$

$$7.5 - B_x - 0.599 A_y = 0 \quad \text{--- (1)}$$

2) $\sum F_y = 0 \uparrow \downarrow$

P#02

$$A_y \cos 36.86^\circ + B_y - 6k - 15 \sin 60^\circ = 0$$

$$0.80 A_y + B_y - 18.99 = 0$$

$$0.80 A_y + B_y = 18.99 \quad \text{--- (2)}$$

$$(3) \sum M_B = 0 \quad \curvearrowright + \curvearrowleft$$

$$(A_y \cos 36.86 \times 90) - (15 \sin 60^\circ \times 10) + 6 \times 2.5 = 0$$

$$16 A_y - 190 + 15 = 0$$

$$16 A_y - 175 = 0$$

$$A_y = \frac{175}{16}$$

$$\boxed{A_y = 10.9375 \text{ k}}$$

Putting the values in equ (2)

$$0.80 (10.9375) + B_y = 18.99$$

$$8.75 + B_y = 18.99$$

$$B_y = 18.99 - 8.75$$

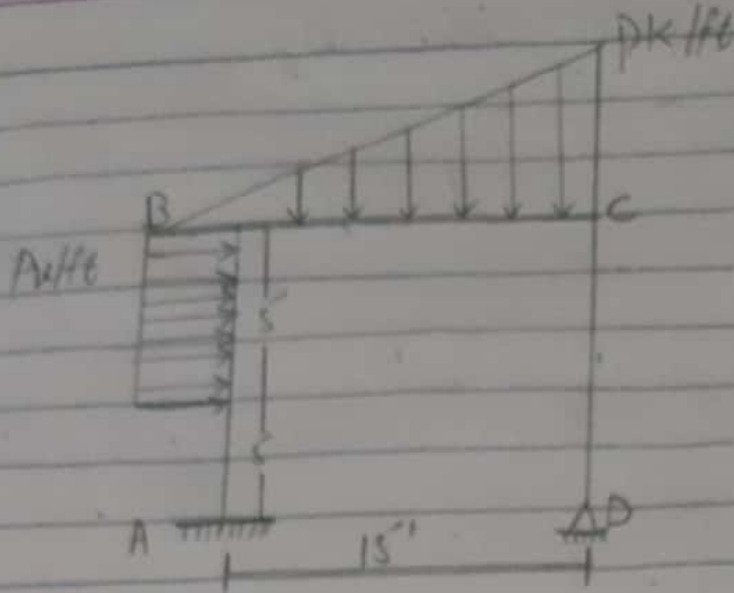
$$\boxed{B_y = 10.25 \text{ k}}$$

Put the value of A_y in equ (1)

$$7.5 - B_u - 0.599(10.9375) = 0$$

$$\boxed{B_u = 0.9375 \text{ k}}$$

Q2

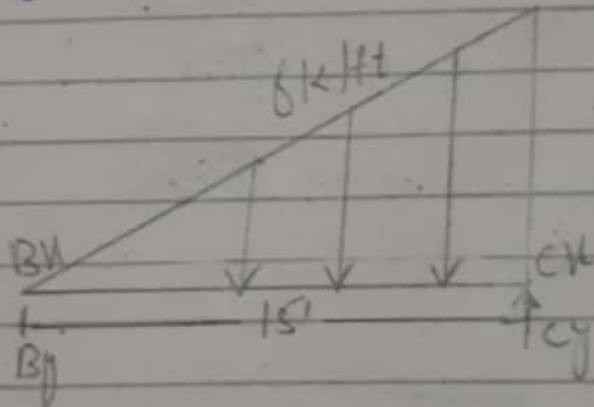


Solution:-

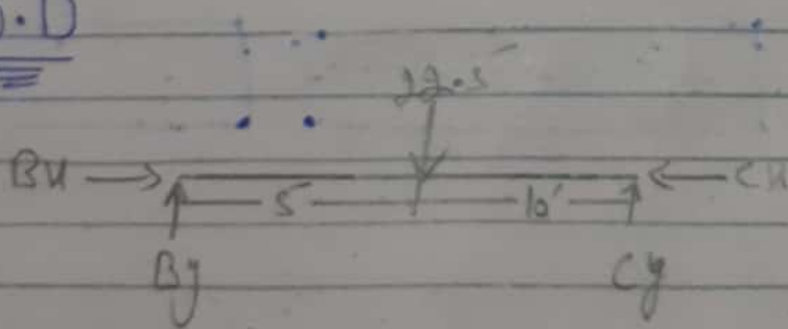
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1) Free body diagram.

U.V.L



B.D



$$\begin{aligned}
 \text{Area} &= \frac{1}{2} bh \\
 &= \frac{1}{2} (15 \times 8) \\
 &= 45 \text{ K}
 \end{aligned}$$

P#04

$$\text{Distance} = \frac{1}{6} (b)$$

$$= \frac{1}{6} (15)$$

$$= 2.5'$$

$$(i) \sum F_x = 0 \rightarrow + \leftarrow$$

$$A_x - (u = 0) = 0 \quad \text{--- (a)}$$

Now,

$$(ii) \sum F_y = 0 \uparrow + \downarrow$$

$$A_y + C_y - \overset{45}{\cancel{\text{[scribble]}}}' = 0$$

$$A_y + C_y = \overset{45}{\cancel{\text{[scribble]}}}' \text{ k} \quad \text{--- (i)}$$

$$(iii) \sum M_A = 0 \curvearrowright +$$

$$(\overset{45}{\cancel{\text{[scribble]}}} \times 5) - C_y \times 15 = 0$$

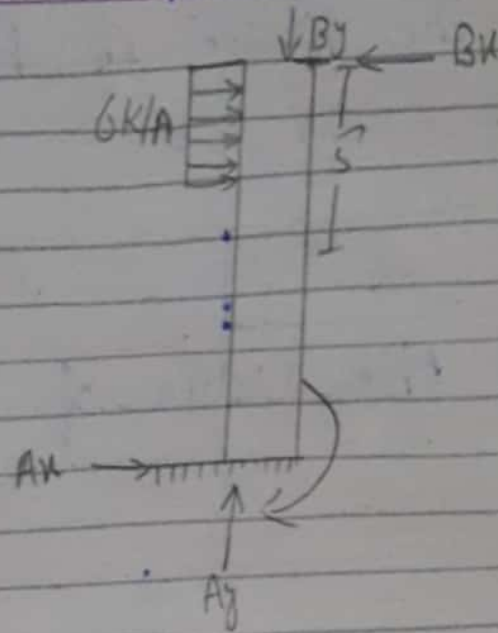
$$\overset{45}{\cancel{\text{[scribble]}}} \times 5 = C_y \times 15 \quad \boxed{C_y = 3375' \text{ k}}$$

Put the values in eqn (1)

$$A_y - 3375 = 45' \text{ k}$$

$$\boxed{A_y = 3420}$$

P#05



$$(i) \sum F_x = 0 \rightarrow + \leftarrow -$$
$$A_x + (7 \times 5) - B_x = 0$$
$$A_x - B_x = -35 \quad \text{--- (1)}$$

$$(ii) \sum F_y = 0 \uparrow + \downarrow -$$
$$A_y - B_y = 0 \quad \text{--- (2)}$$

$$(iii) \sum M_A = 0 \curvearrowright + \curvearrowleft -$$
$$(6 \times 5) \times (2.5 + 5) - B_x \times 10 = 0$$
$$225 - 10 B_x = 0$$

$$\boxed{B_x = 22.5 \text{ k}}$$

Put the value of B_x in (1)

$$A_x - 22.5 = -35$$

$$\boxed{A_x = 12.5}$$

P#06

Put the Value of A_y in eqn ②

$$3420 - B_y = 0$$

$$B_y = 3420 \text{ K}$$

put the Value of A_x in eqn ①

$$12.5 - C_x = 0$$

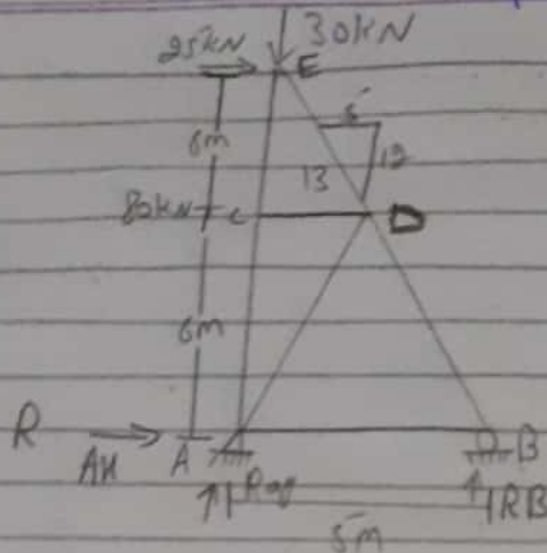
$$C_x = 12.5 \text{ K}$$

Since D is hinge and in the
Projection of point c thus

$$D_x = -12.5 \text{ K}$$

$$D_y = 3375 \text{ K}$$

Q 3



$$\alpha = \tan^{-1} \frac{12}{5}$$

$$\alpha = 67.38 = 67.4^\circ$$

$$B = 90^\circ - 67.4$$

$$B = 22.6^\circ$$

$$\sum M_B = 0 \quad [\uparrow +]$$

$$25 \times 12 - 30 \times 5 + 86 \times 6 + R_{AY} \times 5 = 0$$

$$R_{AY} = 2730 \text{ kN}$$

$$\sum F_y = 0 \quad [\uparrow +]$$

$$2730 - 30 + R_B = 0$$

$$R_B = 2700 \text{ kN}$$

$$\sum F_x = 0 \quad [\rightarrow +]$$

$$R_{AX} + 86 + 25 = 0$$

$$R_{AX} = 111 \text{ kN}$$

Using joints method

Joint B:

$$\sum F_y = 156 + F_{BD} \sin \alpha$$

P# 08

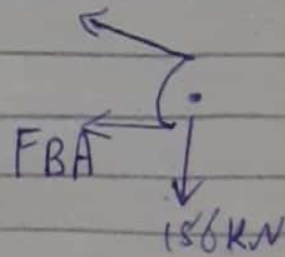
$$FBD = \frac{-156}{\sin(67.4)}$$

$$FBD = 169.5$$

$$\sum F_x = 0$$

$$FBD = 169.5 \cos \theta$$

$$= 64.41 \text{ kN}$$



Joint E:

$$\sum F_y = 0 \quad [\uparrow +]$$

$$-30 - F_{EC} - F_{ED} \cos \beta = 0$$

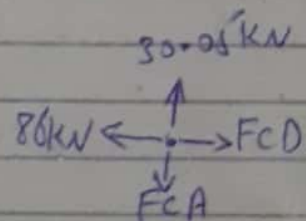
$$30 - F_{EC} - (-65.05 \text{ kN}) \cos 29.6^\circ = 0$$

$$25 + F_{ED} \sin \beta = 0$$

$$F_{ED} = -65.05 \text{ kN}$$

$$F_{EC} = 30.05 \text{ kN}$$

~~$$\sum F_x = 0 \quad [\rightarrow +]$$~~



Joint C:

$$\sum F_x = 0 \quad [\rightarrow +] \Rightarrow F_{CD} = -80 \text{ kN}$$

$$F_y = 0 \quad [\uparrow +]$$

$$F_{CA} = 30.05$$

P#09

Joint A :-

$$\sum F_H = 0$$

$$111 + F_{AD} \cos \alpha + 64.41 = 0$$

$$F_{AD} = 106.81$$

Member forces :-

$$F_{AB} \quad 64.41$$

$$F_{AC} \quad 30.5$$

$$F_{BD} \quad 167.5$$

$$F_{CD} \quad -86$$

$$F_{CE} \quad 30.5 \text{ kN}$$

$$F_{DE} \quad 65.05$$