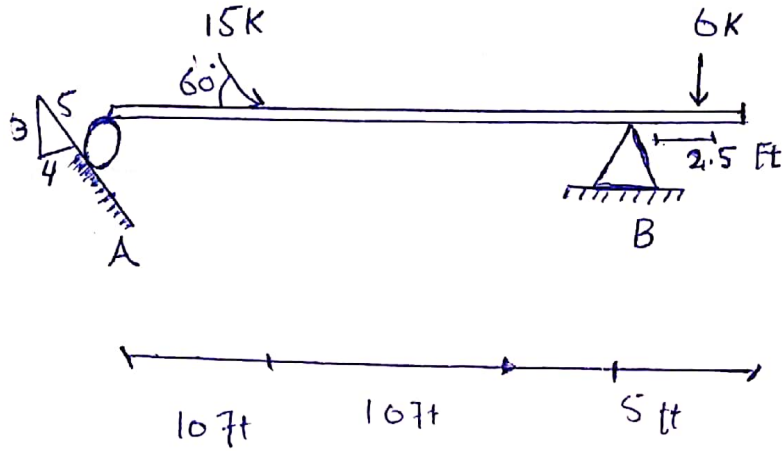


Ans (01)



Support reaction

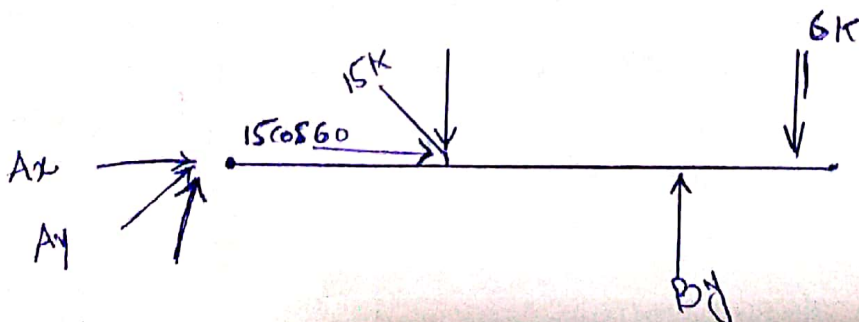
Using eq of equilibrium

Steps

Draw free body diagram.

Identify the type of support provide

Resolve the inclined force into



Now Using Equation of equilibrium

As

$$\tan \theta = (3/4)$$

$$\theta = \tan^{-1}(3/4)$$

$$\boxed{\theta = 36^\circ}$$

$$\sum F_y = 0 \quad \uparrow \downarrow$$

$$A_y + B_y - 15 \sin 60 - 6 = 0$$

$$A_y + B_y - 12.99 - 6 = 0$$

$$A_y + B_y = 18.99 \text{ K}$$

$$\sum F_x = 0 \quad \rightleftarrows$$

$$+ A_x + 15 \cos 60 = 0$$

$$\boxed{A_x = -7.5 \text{ K}} \quad \text{opposit to assume direction}$$

$$\sum M_B = 0 \quad \curvearrowright \curvearrowleft$$

$$A_y \cos 36 (20) + 15 \sin 60 (10) + 6(2.5) = 0$$

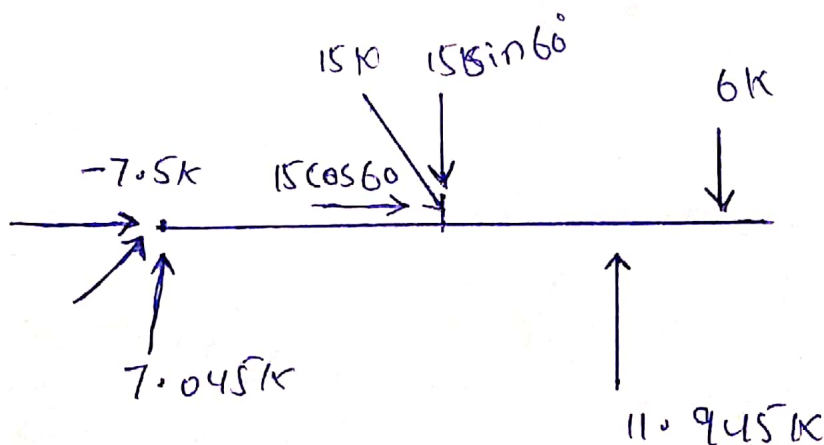
$$A_y (16.18) - 129 + 15 = 0$$

$$A_y = \frac{114}{16.18}$$

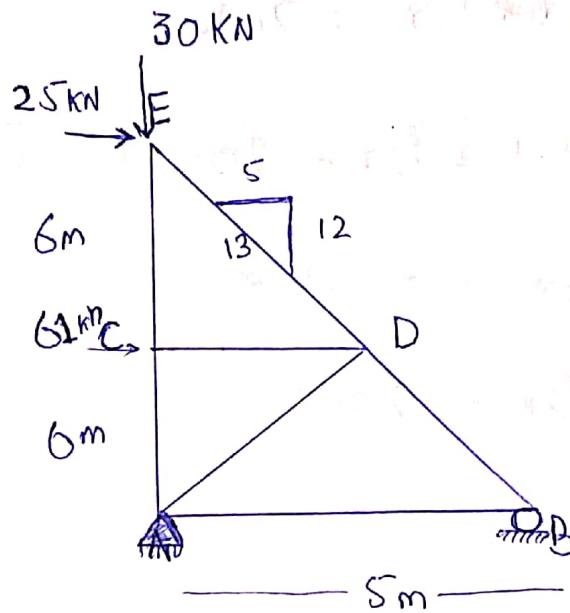
$$A_y = 7.045 \text{ K}$$

by putting in eq "i"

$$B_y = 11.945 \text{ K}$$



Ans 03



Determine the force in  
each member

first we find the supports  
reaction

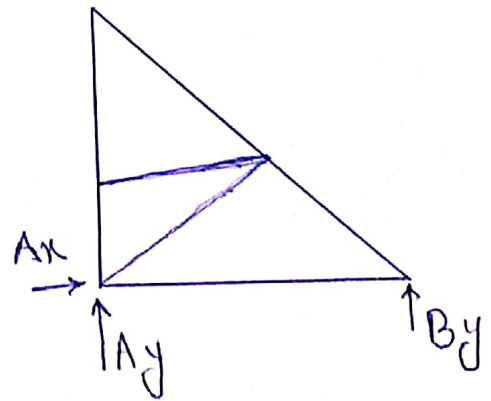
$$\sum M_A = 0 \quad \downarrow$$

$$71(6) + 25(12) - B_y(5) = 0$$

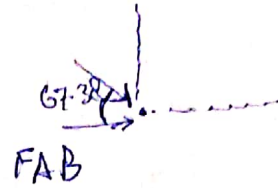
$$732 - 5B_y = 0$$

$$B_y = 146.4 \text{ kN}$$

$$\sum \vec{F}_x = 0$$



$$\sum \theta x = 0 \rightleftharpoons^{+}$$



$$F_{AB} + F_{DB} \cdot \cos(67.38^\circ)$$

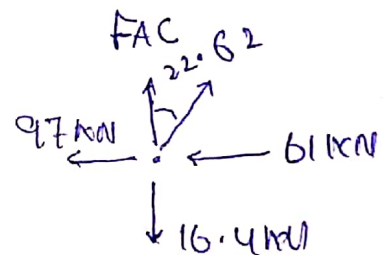
$$F_{AB} = 158 \cdot 60 \cdot \cos(67.38^\circ)$$

$$\boxed{F_{AB} = 61 \text{ kN}}$$

⇒ (Joint A)

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

$$F_{AC} - 116.4 + F_{AD} \cos(22.62^\circ) = 0$$



$$F_{AC} - 116.4 + 0.923 F_{AD} = 0 \quad (i)$$

$$\sum \theta x = 0 \rightleftharpoons^{+}$$

$$-97 - 61 + F_{AD} \sin(22.62^\circ) = 0$$

$$F_{AD} (0.384) = 158$$

$$F_{AD} (0.384) = 158 \Rightarrow \boxed{F_{AD} = 411 \text{ kN}}$$

$$\sum \Delta x = 0 \rightleftarrows^+$$

$$\sum \Delta y = 0 \updownarrow^+$$

$$25 + 72 - Ax = 0$$

$$-30 + Ay + 146.4 = 0$$

$$Ax = 97 \text{ kN}$$

$$Ay = -116.4$$

opposite to assume direction.

Now

$$\tan \theta = 12/5$$

$$\theta = \tan^{-1}(12/5)$$

$$\theta = 67.38^\circ$$

(Joint B)

$$\sum \Delta y = 0 \updownarrow^+$$

$$146.4 - F_{DB} \sin(67.38^\circ) = 0$$

$$F_{DB} = \frac{146.4}{\sin(67.38^\circ)}$$

$$F_{DB} = 158.61 \text{ kN}$$

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Now eq "1"  $\Rightarrow$

$$F_{AC} = 116.4 - 0.923(411)$$

$$F_{AC} = -262.953 \text{ kN}$$

$$F_{AC} = 262.953 \text{ kN } (\downarrow +)$$

$\Rightarrow$  (Joint C)

$$\sum \uparrow \downarrow = 0$$

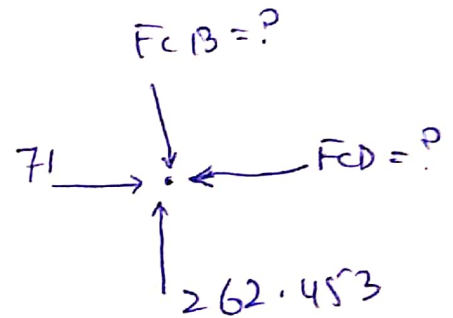
$$F_{CB} - 262.953 = 0$$

$$\boxed{F_{CB} = 262.953 \text{ kN}}$$

$$\sum \rightarrow \leftarrow = 0$$

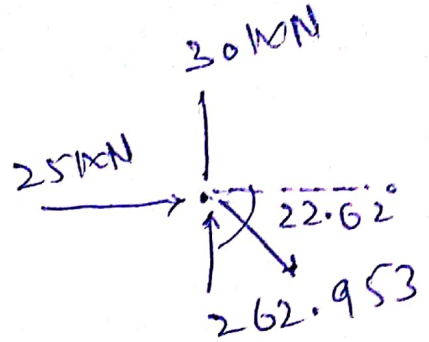
$$-F_{CD} + 71 = 0$$

$$\boxed{F_{CD} = 71 \text{ kN}}$$



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⇒ (Joint E)



$$\sum F_y = 0 \quad \downarrow \uparrow$$

$$-30 + 262.953 - F_{ED} (\cos(22.62)) = 0$$

$$(0.923) F_{ED} = 232.953$$

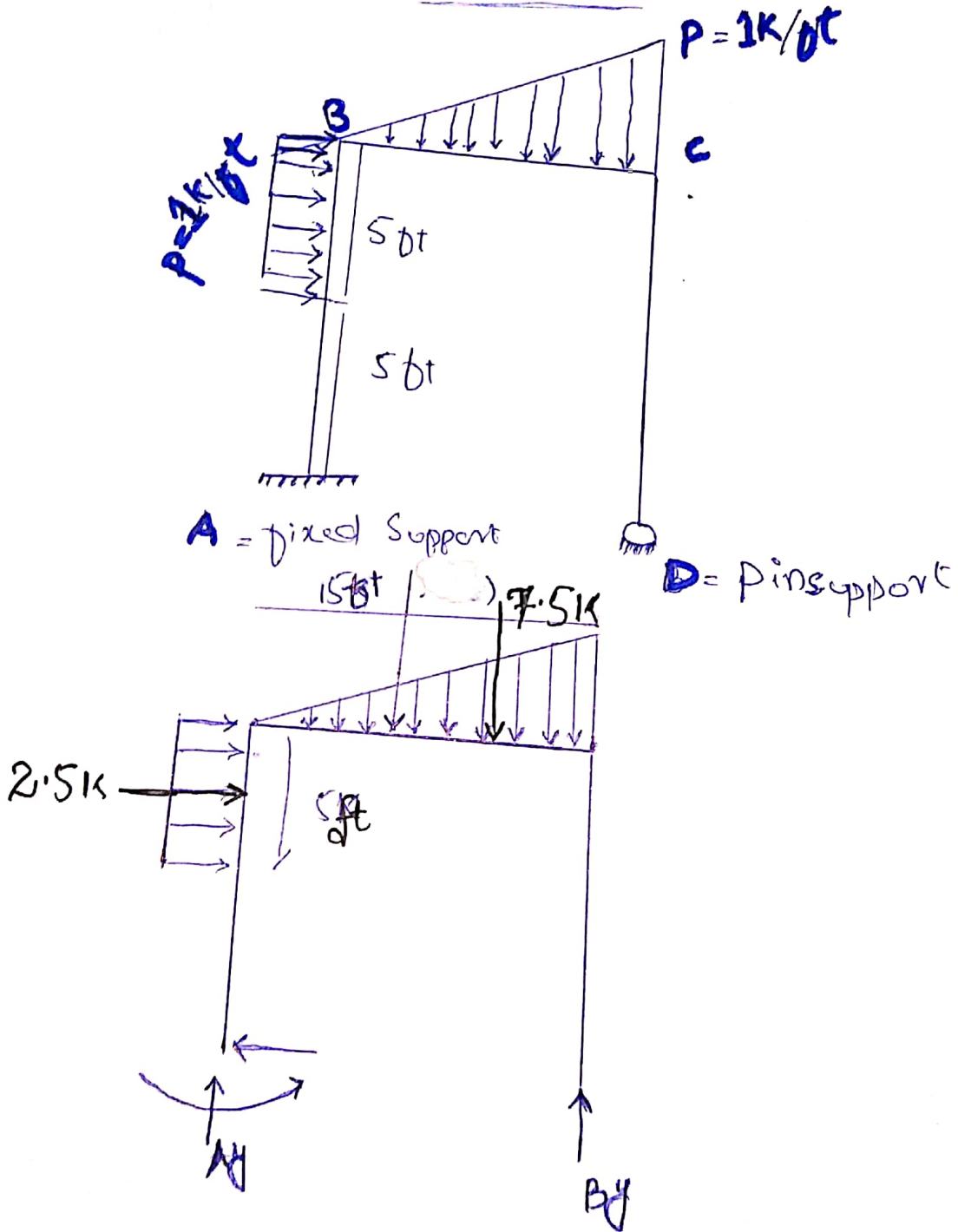
$$F_{ED} = 252.38 \text{ kN}$$





# ANS (02)

"Given figure"



Q

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Now  
=

$$\sum \uparrow x = 0 \iff$$

$$-7.5 - 17.5 + (Cx + Dx) = 0$$

$$Cx + Dx = 20k \text{ --- (iii)}$$

$$\sum M_0 = 0 \hookrightarrow$$

$$- (Cx \times 10) + (7.5 \times 10) - (7.5 \times 10)$$

$$- (Cx - 10Cx) + 7.5 - 7.5 - 7.5 = 0$$

$$-10Cx = 14.2 = 0$$

$$10Cx = -14.2$$

$$10Cx = 14.2$$

$$\boxed{Cx = 1420} \quad \leftarrow$$

Taking Segment 'A' 86

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

$$-B_x - A_x = 7.5$$

$$B_x + A_x = -7.5 \quad \text{--- (ii)}$$

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

$$A_y - 17.5 = 0$$

$$A_y = 17.5 \text{ kN}$$

$$\sum M_A = 0$$

$$B_x(10) - 10(7.5) = 0$$

$$10B_x - 75 = 0$$

$$B_x = 7.5$$

eq (ii)  $\Rightarrow$

$$B_x + A_x = -10$$

$$A_x = -17.5 \text{ kN}$$

$$B_x = 17.5 \text{ kN}$$

~~8 (02)~~

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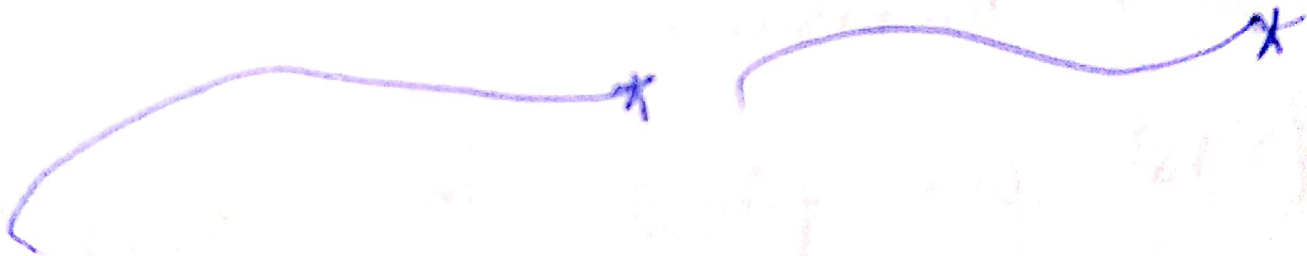
eq (iii)

$$Cx + Dx = 20K$$

$$42.5 + Dx = 20$$

$$Dx = 22.5K$$

$$Dx = 20K$$



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SECTION # C