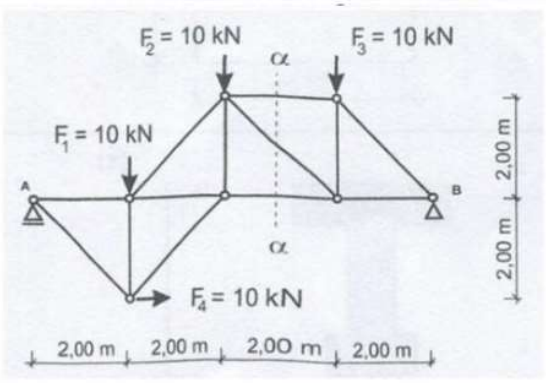
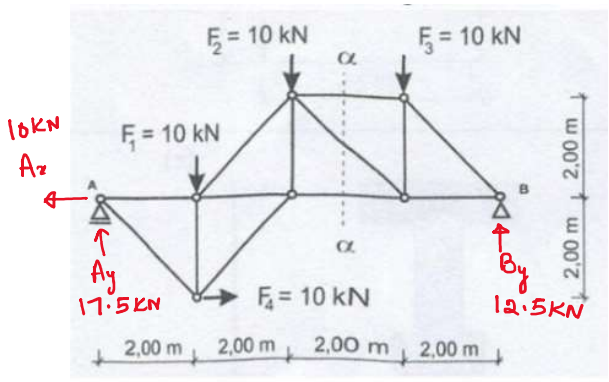
Ritter's Method Truss Analysis Problem-3 Solution

Please find the forces of members in α - α section using Ritter method.



Step-1: Find the support reactions in Truss:



$\overset{+}{\rightarrow} \Sigma F_x = 0$:

$-A_x + 10 = 0 \quad \Rightarrow \quad A_x = 10\,KN$

$\circlearrowleft + \Sigma M_B = 0$:

$(A_y \times 8) - (10 \times 6) - (10 \times 4) - (10 \times 2) - (10 \times 2) = 0$

$\Rightarrow A_y = 17.5\,KN$

$\circlearrowleft + \Sigma M_A = 0$:

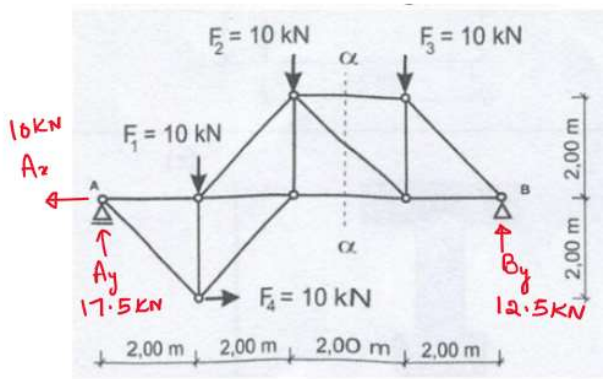
$(10 \times 2) - (10 \times 2) + (10 \times 4) + (10 \times 6) - (B_y \times 8) = 0$

$\Rightarrow B_y = 12.5\,KN$

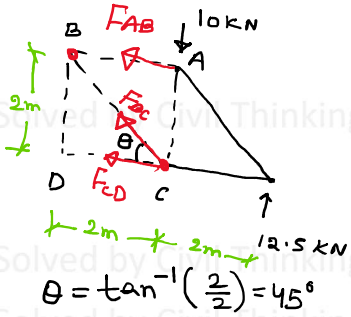
Check:

$+\uparrow \Sigma F_y = 17.5 - 10 - 10 - 10 + 12.5 = 0$ O.K.

Step-2: Apply Ritter's method on a simpler portion to the left or right of α-α section:



Choosing Right Portion:



$\theta = \tan^{-1}\left(\frac{2}{2}\right) = 45^\circ$

$\curvearrowright \Sigma M_C = 0$:

$-(12.5 \times 2) - (F_{AB} \times 2) = 0$ $\Rightarrow F_{AB} = -12.5\,kN$

$\curvearrowright \Sigma M_B = 0$:

$-(12.5 \times 4) + (10 \times 2) + (F_{CD} \times 2) = 0$ $\Rightarrow F_{CD} = 15\,kN$

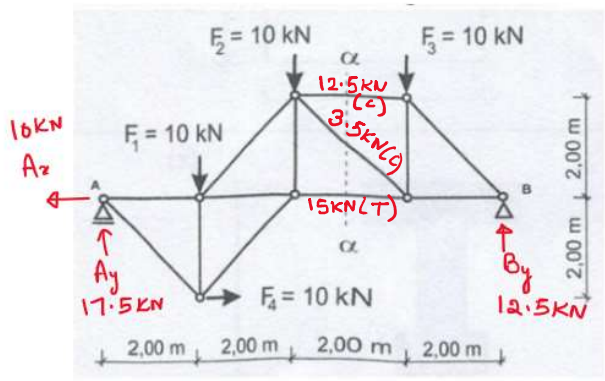
$\rightarrow \Sigma F_x = 0$:

$-15 - (-12.5) - F_{BC}\cos 45^\circ = 0$ $\Rightarrow F_{BC} = \frac{-5\sqrt{2}}{2} = -3.5\,kN$

Check:

$+\uparrow \Sigma F_y = -10 + (-\frac{5\sqrt{2}}{2})\sin 45^\circ + 12.5 = 0$ O.K.

Final Answers:



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