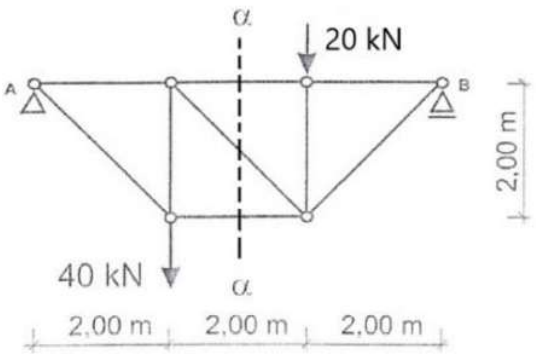
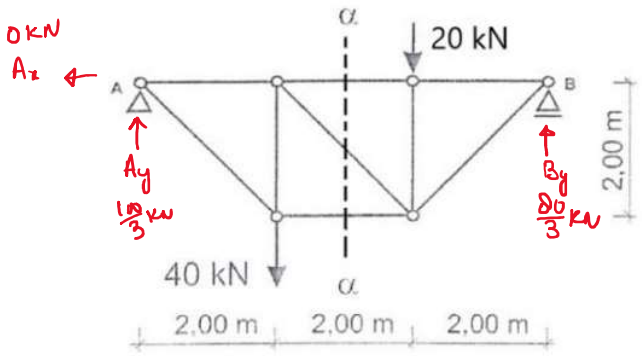
Ritter's Method Truss Analysis Problem-2 Solution

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



Step-1: Find the support reactions:



$\overrightarrow{+}\ \Sigma F_x = 0:$

$A_x = 0$

$\circlearrowleft + \Sigma M_B = 0:$

$(A_y \times 6) - (40 \times 4) - (20 \times 2) = 0$

$\Rightarrow A_y = \frac{100}{3}\,KN = 33.33\,KN$

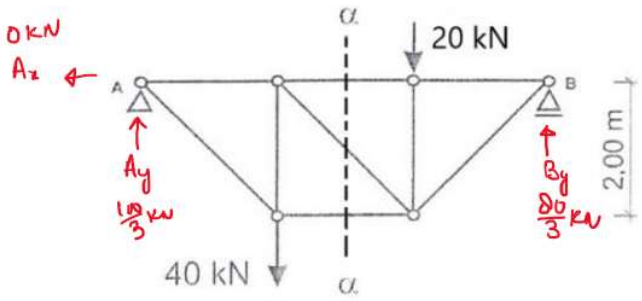
$\circlearrowleft + \Sigma M_A = 0:$

$-(B_y \times 6) + (20 \times 4) + (40 \times 2) = 0$

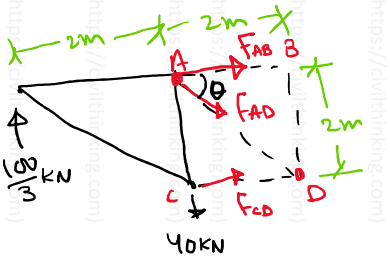
$\Rightarrow B_y = \frac{80}{3}\,KN = 26.67\,KN$

Check:

$+\uparrow \Sigma f_y = \frac{100}{3} - 40 - 20 + \frac{80}{3} = 0$ O.K.



choose left side of α-α



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

$\circlearrowleft^{+} \Sigma M_A = 0$:

$\left(\frac{100}{3} \times 2\right) - (F_{CD} \times 2) = 0 \Rightarrow F_{CD} = \frac{100}{3}$ kN

$\circlearrowleft^{+} \Sigma M_D = 0$:

$\left(\frac{100}{3} \times 4\right) - (40 \times 2) + (F_{AB} \times 2) = 0 \Rightarrow F_{AB} = -\frac{80}{3}$ kN

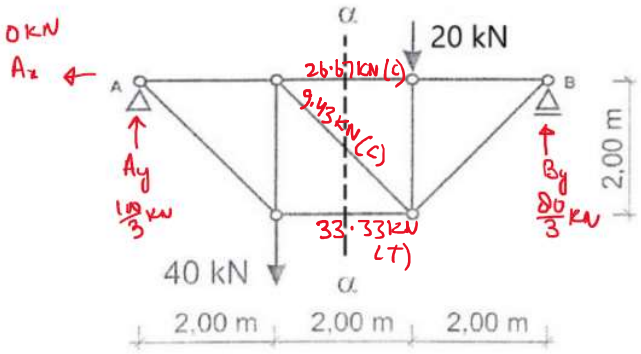
$\overset{+}{\rightarrow} \Sigma F_x = 0$:

$\frac{100}{3} + \left(-\frac{80}{3}\right) + F_{AD}\cos 45° = 0 \Rightarrow F_{AD} = -\frac{20\sqrt{2}}{3}$ kN

Check:

$+\uparrow \Sigma F_y = \frac{100}{3} - 40 - \left(-\frac{20\sqrt{2}}{3}\right)\sin 45° = 0$ O.K.

Final Answers:



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