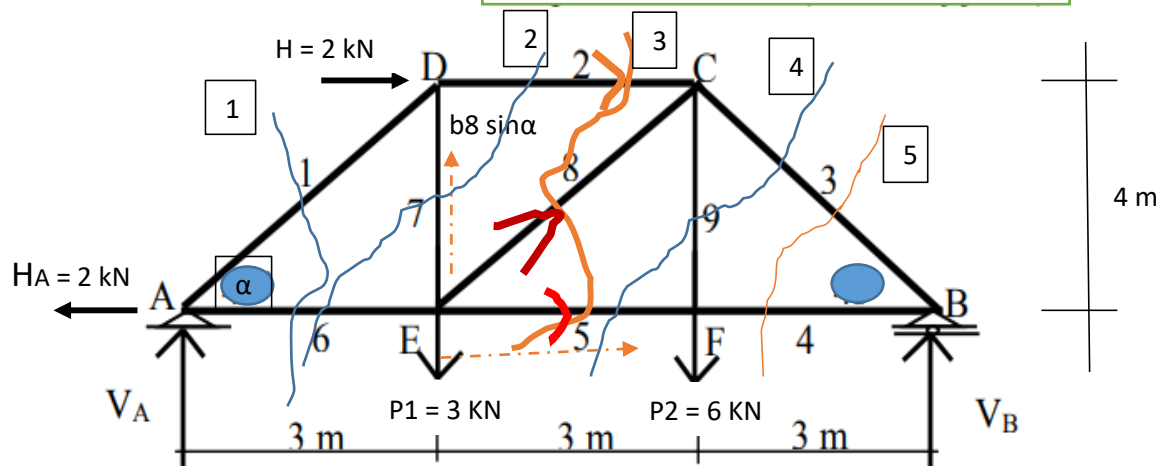


Contoh-Contoh Soal dan Pembahasan

Soal 1. Tentukan gaya-gaya batang dari rangka batang di bawah ini dengan metode Potongan (Ritter)



Mencari Reaksi Tumpuan :

$$\sum H = 0 \rightarrow H_A = 2 \text{ KN (arah ke kiri)}$$

$$\sum MB = 0 \rightarrow V_a \cdot 9 - (P1) \cdot 6 - (P2) \cdot 3 + H \cdot 4 = 0$$

$$V_a = \frac{(3 \cdot 6) + (6 \cdot 3) - (2 \cdot 4)}{9}$$

$$V_a = 3,111 \text{ KN} \quad (\uparrow)$$

$$\sum M_A = 0 \rightarrow -V_B \cdot 9 + (P_1 \cdot 3) + (P_2 \cdot 6) + (H \cdot 4) = 0$$

$$VB = \frac{(3 \cdot 3) + (6 \cdot 6) + (2 \cdot 4)}{9}$$

$$V_B = 5,889 \text{ KN (} \uparrow \text{)}$$

KONTROL :

$$\sum K_v = 0 \rightarrow V_a + V_b - P_1 - P_2 = 0$$

$$3,111 + 5,889 - 3 - 6 = 0$$

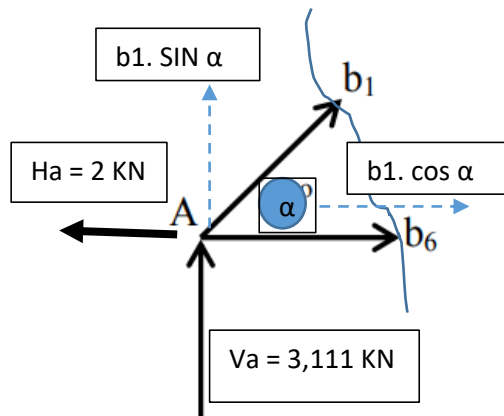
$0 = 0$ (oke)

$$\text{Sisi miring} = \sqrt{3^2 + 4^2} = 5 \text{ m}$$

$$\sin \alpha = 4/5 = 0,8$$

$$\cos \alpha = 3/5 = 0,6$$

Potongan 1



$$\sum K_V = 0$$

$$b_1 \sin \alpha + V_a = 0$$

$$b_1 = \frac{-V_a}{\sin \alpha}$$

$$b_1 = -3,111 / (0,8) = -3,889 \text{ KN (tekan)}$$

$$\sum K_H = 0$$

$$b_6 + b_1 \cos \alpha - H_a = 0$$

$$b_6 = -b_1 \cos \alpha + H_a$$

$$= -(-3,889) \cdot 0,6 + 2 = 4,333 \text{ KN (tarik)}$$

Potongan 2

$$\sum K_V = 0$$

$$V_a - b_7 = 0$$

$$b_7 = V_a = 3,111 \text{ KN (tarik)}$$

$$\sum M_E = 0$$

$$V_a \cdot 3 + H \cdot 4 + b_2 \cdot 4 = 0$$

$$\begin{aligned} b_2 &= (-V_a \cdot 3 - H \cdot 4) / 4 \\ &= \frac{(-3,111 \cdot 3) - (2 \cdot 4)}{4} \\ &= -4,333 \text{ KN (tekan)} \end{aligned}$$

Atau

$$\sum K_H = 0$$

$$-H_a + H + b_6 + b_2 = 0$$

$$b_2 = H_a - H - b_6 = 2 - 2 - 4,333 = -4,333 \text{ KN (tekan) apabila } b_6 \text{ diambil dari potongan 1}$$

seandainya b_6 blm juga diketahui mencari b_6 dg cara :

$$\sum M_D = 0$$

$$V_a \cdot 3 + H_a \cdot 4 - b_6 \cdot 4 = 0$$

$$\begin{aligned} b_6 &= (V_a \cdot 3 + H_a \cdot 4) / 4 \\ &= \frac{(3,111 \cdot 3) + (2 \cdot 4)}{4} \\ &= 4,333 \text{ KN (tekan)} \end{aligned}$$

Potongan 3

$$\Sigma K V = 0$$

$$V_a - P_1 + b_8 \cdot \sin \alpha = 0$$

$$\begin{aligned} b_8 &= (-V_a + P_1) / \sin \alpha \\ &= (-3,111 + 3) / 0,8 \\ &= -0,139 \text{ KN (tekan)} \end{aligned}$$

$$\Sigma M C = 0$$

$$(H_a \cdot 4) + (V_a \cdot 6) - P_1 \cdot 3 - (b_5 \cdot 4) = 0$$

$$\begin{aligned} b_5 &= ((2 \cdot 4) + (3,111 \cdot 6) - (3 \cdot 3)) / 4 \\ &= 4,417 \text{ KN (tekan)} \end{aligned}$$

$$\Sigma M E = 0$$

$$(V_a \cdot 3) + (H \cdot 4) + (b_2 \cdot 4) = 0$$

$$\begin{aligned} b_2 &= (-3,111 \cdot 3) - (2 \cdot 4) / 4 \\ &= -4,333 \text{ KN (tekan)} \end{aligned}$$

