

Nilai

$$F_1 = 400 \frac{kg}{h}$$

$$F_2 = 800 \frac{kg}{h}$$

$$y_{in} = 0,1$$

$$x_{in} = 0$$

$$k = 5$$

Persamaan untuk massa 1

$$F_1 y_{in} + F_2 X_1 = F_1 Y_1 + F_2 X_{out}$$

Subtitusikan

$$X_1 = kY_1$$

$$X_{out} = kY_{out}$$

Didapat persamaan

$$F_1 Y_{in} + F_2 kY_1 - F_1 Y_1 - F_2 kY_{out} = 0$$

Masukan nilai kedalam persamaan, maka didapat

Persamaan 1

$$400(0,1) + 800 (5) Y_1 - 400 Y_1 - 800 (5) Y_{out} = 0$$

$$40 + 4000 Y_1 - 400 Y_1 - 4000 Y_{out} = 0$$

$$40 + 3600 Y_1 - 4000 Y_{out} = 0$$

$$3600 Y_1 - 4000 Y_{out} = -40$$

Persamaan untuk massa 2

$$F_1 Y_1 + F_2 X_2 = F_1 Y_2 + F_2 X_1$$

Subtitusikan

$$X_1 = kY_1$$

$$X_2 = kY_2$$

Didapat persamaan

$$F_1 Y_1 + F_2 kY_2 - F_1 Y_2 - F_2 kY_2 = 0$$

Masukan nilai kedalam persamaan, maka didapat

Persamaan 2

$$400 Y_1 + 800 (5) Y_2 - 400 Y_2 - 800 (5) Y_1 = 0$$

$$400 Y_1 + 4000 Y_2 - 400 Y_2 - 4000 Y_1 = 0$$

$$-3600 Y_1 + 3600 Y_2 = 0$$

Persamaan untuk massa 3

$$F_1 Y_2 + F_2 X_3 = F_1 Y_3 + F_2 X_2$$

Substitusikan

$$X_2 = kY_2$$

$$X_3 = kY_3$$

Didapat persamaan

$$F_1 Y_2 + F_2 kY_3 - F_1 Y_3 - F_2 kY_2 = 0$$

Masukan nilai kedalam persamaan, maka didapat

Persamaan 3

$$400 Y_2 + 800 (5) Y_3 - 400 Y_3 - 800 (5) Y_2 = 0$$

$$400 Y_2 + 4000 Y_3 - 400 Y_3 - 4000 Y_2 = 0$$

$$-3600 Y_2 + 3600 Y_3 = 0$$

Persamaan untuk massa 4

$$F_1 Y_3 + F_2 X_4 = F_1 Y_4 + F_2 X_3$$

Substitusikan

$$X_3 = kY_3$$

$$X_4 = kY_4$$

Didapat persamaan

$$F_1 Y_3 + F_2 kY_4 - F_1 Y_4 - F_2 kY_3 = 0$$

Masukan nilai kedalam persamaan, maka didapat

Persamaan 4

$$400 Y_3 + 800 (5) Y_4 - 400 Y_4 - 800 (5) Y_3 = 0$$

$$400 Y_3 + 4000 Y_4 - 400 Y_4 - 4000 Y_3 = 0$$

$$-3600 Y_3 + 3600 Y_4 = 0$$

Persamaan untuk massa 5

$$F_1 Y_4 + F_2 X_{in} = F_1 Y_{out} + F_2 X_4$$

Subtitusikan

$$X_4 = kY_4$$

Didapat persamaan

$$F_1 Y_4 + F_2 X_{in} - F_1 Y_{out} - F_2 k Y_4 = 0$$

Masukan nilai kedalam persamaan, maka didapat

Persamaan 5

$$400 Y_4 + 800 (0) - 400 Y_{out} - 800 (5) Y_4 = 0$$

$$400 Y_4 - 400 Y_{out} - 4000 Y_4 = 0$$

$$-3600 Y_4 - 400 Y_{out} = 0$$

Maka dihasilkan dari 5 persamaan diatas menjadi

$$3600 Y_1 - 4000 Y_{out} = -40$$

$$-3600 Y_1 + 3600 Y_2 = 0$$

$$-3600 Y_2 + 3600 Y_3 = 0$$

$$-3600 Y_3 + 3600 Y_4 = 0$$

$$-3600 Y_4 - 400 Y_{out} = 0$$

Di dapat matrix AC=B

$$\begin{bmatrix} 3600 & 0 & 0 & 0 & -40 \\ -3600 & 3600 & 0 & 0 & 0 \\ 0 & -3600 & 3600 & 0 & 0 \\ 0 & 0 & -3600 & 3600 & 0 \\ 0 & 0 & 0 & -3600 & -400 \end{bmatrix} \begin{bmatrix} Y_1 \\ Y_2 \\ Y_3 \\ Y_4 \\ Y_{out} \end{bmatrix} = \begin{bmatrix} -40 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$