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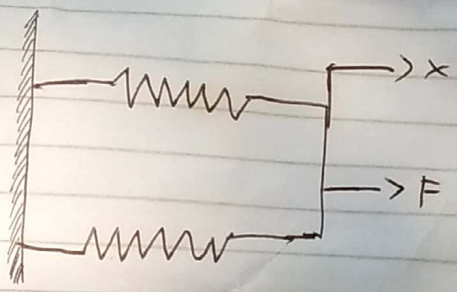
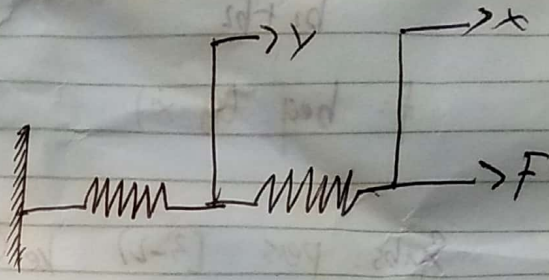
Kelas : A

SISTEM KENDALI

3-1



(a)



$k_1 x + k_2 x = F = k_{eq} x$

or $k_{eq} = k_1 + k_2$

$k_1 y = F, \quad k_2 (x - y) = F$

eliminasi aF y dari 2 persamaan

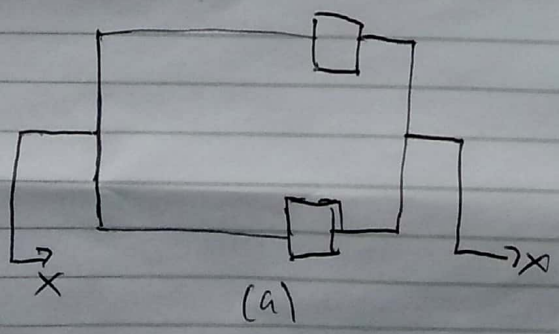
$$k_2 \left(x - \frac{F}{k_1}\right) = F$$

or

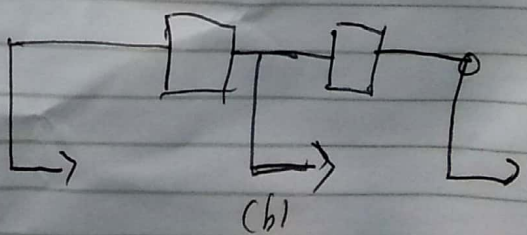
$$k_2 x = F + \frac{k_2}{k_1} F = \frac{k_1 + k_2}{k_1} F$$

$$k_{eq} = \frac{F}{x} = \frac{k_1 k_2}{k_1 + k_2} = \frac{1}{\frac{1}{k_1} + \frac{1}{k_2}}$$

3-2



(a)



(b)

a) $f = b_1 (y - x) + b_2 (\dot{y} - \dot{x}) = (b_1 + b_2)(\dot{y} - \dot{x})$

$f = b_{eq} (\dot{y} - \dot{x}) \rightarrow b_{eq} = b_1 + b_2$

b) $f = b_1(\dot{z} - \dot{x}) = b_2(\dot{x} - \dot{z})$ (3-1)

$(b_1 + b_2)\dot{z} = b_2\dot{y} + b_1\dot{y}$

$\dot{z} = \frac{1}{b_1 + b_2}(b_2\dot{y} + b_1\dot{x})$ (3-2)

$f = b_{eq}(\dot{y} - \dot{x})$

Subs. pers (3-2) ke (3-1)

$f = b_2(\dot{y} - \dot{z}) = b_2\left[\dot{y} - \frac{1}{b_1 + b_2}(b_2\dot{y} + b_1\dot{x})\right]$

$= \frac{b_1 b_2}{b_1 + b_2}(\dot{y} - \dot{x})$

Jadi $f = b_{eq}(\dot{y} - \dot{x}) = \frac{b_1 b_2}{b_1 + b_2}(\dot{y} - \dot{x})$

$b_{eq} = \frac{b_1 b_2}{b_1 + b_2} = \frac{1}{\frac{1}{b_1} + \frac{1}{b_2}}$