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A = 3 C = 0

B = 2

1. a $G(s) = \frac{10}{s+2} \frac{\frac{1}{2}}{\frac{1}{2}}$ $k = 5$

$\tau = 0{,}5$ sec

$G(s) = \frac{5}{0{,}5s + 1}$

$T_s (\pm 0{,}5\ \%)$. 2 sec

$5\tau^* = 2$

$\tau^* = 0{,}4$ sec

$\tau_i = \tau$

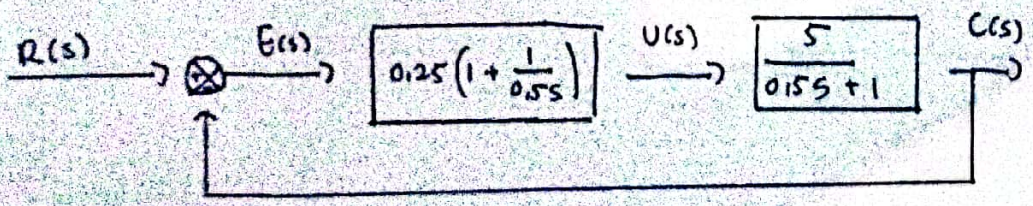
$\tau_i = 0{,}5$ s

$K_p = \frac{\tau_i}{k.\tau^*}$

$= \frac{0{,}5}{5 . 0{,}4}$

$= 0{,}25$

b. Diagram Blok



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2.

$$G(s) = \frac{10\,(0{,}05\,s + 1)}{s^2 + 3s} \quad \begin{matrix} \times \frac{1}{3} \\ \times \frac{1}{3} \end{matrix}$$

$$G(s) = \frac{3{,}33\,(0{,}05s + 1)}{0{,}3s^2 + s}$$

$$G(s) = \frac{3{,}33\,(0{,}05s + 1)}{s(0{,}3s + 1)} \qquad k = 3{,}33 \qquad \tau = 0{,}05 \text{ det} \qquad T = 0{,}3$$

$$T_s\,(\pm 2\%) = 4\tau$$

$$4\tau^* = 2$$

$$\tau^* = 0{,}5 \text{ det}$$

$$\tau_{d_2} = \tau$$

$$\tau_{d_2} = 0{,}05 \text{ det}$$

$$\tau_{d_1} = T - \tau_{d_2}$$

$$= 0{,}3 - 0{,}05$$

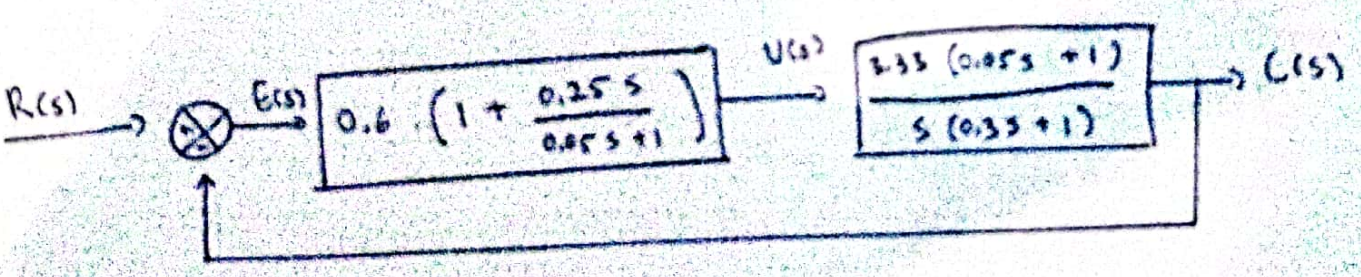
$$= 0{,}25$$

$$K_p = \frac{1}{\tau^* \cdot k}$$

$$= \frac{1}{0{,}5 \cdot 3{,}33}$$

$$= 0{,}6$$

Diagram blok



Simulink

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3.

$$G(s) = \frac{2}{s^2 + 20s + 25} \cdot \frac{\frac{1}{25}}{\frac{1}{25}}$$

$$= \frac{0.08}{\frac{1}{25}s^2 + \frac{4}{5}s + 1}$$

$k = 0.08$

$\omega_n^2 = 25$

$\omega_n = 5$

$$\frac{2\xi}{\omega_n} = \frac{1}{5} \qquad \xi = 2$$

$$\frac{2\xi}{8} = \frac{4.2}{8}$$

$T_s (\pm 5\%) = 3\tau^*$

$3\tau^* = 2$

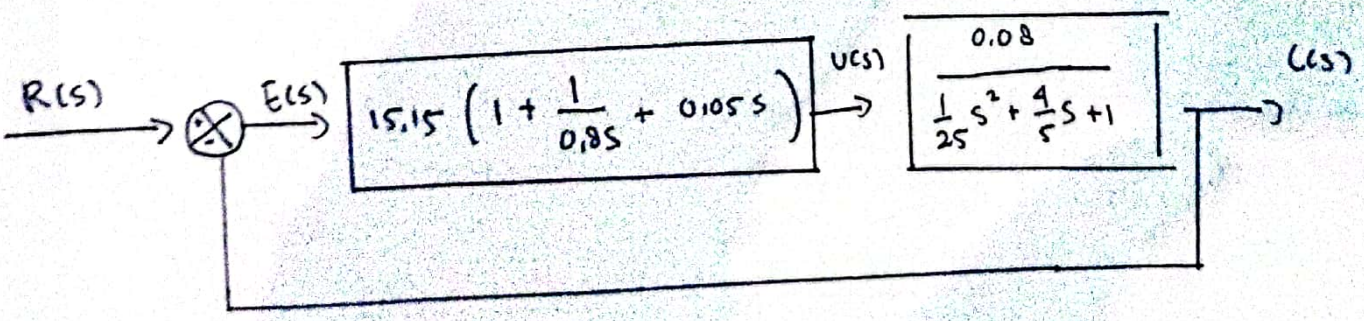
$\tau^* = 0.66$

$$\tau_i = \frac{2\xi}{\omega_n} = \frac{2.2}{5} = 0.8$$

$$\tau_d = \frac{1}{2\xi\omega_n} = \frac{1}{2.2.5} = 0.05$$

$$K_p = \frac{2\xi}{\tau^* . \omega_n . k} = \frac{2.2}{0.66 . 5 . 0.08} = 15.15$$

Diagram Blok



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