(c) $t_s \geq 10s \Rightarrow \frac{4.6}{\zeta\omega_n} = 0 \Rightarrow \zeta\omega_n = 0.46$

steady state error do ramp input $= 0.1 \Rightarrow \frac{1}{K_v} = 0.1 \quad K_v = 10$

need $\lim_{s\to 0} sC(s)G(s) = 10$

$$sC(s)G(s) = s\frac{\left(K_p + \frac{1}{s}K_I\right)\frac{1}{10}}{s + \frac{1}{440}}$$

$$\lim_{s\to 0} sC(s)G(s) = \frac{\frac{1}{10}K_I}{\frac{1}{440}} = 44K_I \Rightarrow K_I = \frac{10}{44}$$

closed loop:

$$\frac{T_o(s)}{T_i(s)} = \frac{\left(K_p + \frac{K_I}{s}\right)\frac{1}{10}}{s + \frac{1}{440}} \Big/ 1 + \frac{\left(K_p + \frac{K_I}{s}\right)\frac{1}{10}}{s + \frac{1}{440}} = \frac{\frac{1}{10}\left(K_p s + K_I\right)\frac{1}{s}}{s + \frac{1}{440} + \frac{1}{10}\left(K_p s + K_I\right)\frac{1}{s}}$$

$$= \frac{\frac{1}{10}\left(K_p s + K_I\right)}{s^2 + \underbrace{\left(\frac{1}{440} + \frac{K_p}{10}\right)}_{2\zeta\omega_n} s + \underbrace{\frac{K_I}{10}}_{1/44 \Rightarrow \omega_n =}}$$

$$\omega_n \text{ or } 2\zeta\omega_n = 2(0.46) = 0.92 = \frac{1}{440} + \frac{K_p}{10}$$

$$K_p = 10\left(0.92 - \frac{1}{440}\right) = 9.18$$

$$K_p = 9.18$$