ECE 365 Q3 s/s 00

NAME: KEY

Honor Code:

A second order system is operating with $T_p = 10\,s$ and $T_s = 20\,s$.

Find the overshoot.

$$\boxed{\%OS = 13.54\%}$$

- $\frac{4}{\zeta\omega_n} = 20 \qquad \omega_n = \frac{1}{5\zeta}$

- $T_O = \frac{\pi}{\omega_n\sqrt{1-\zeta^2}} \qquad \omega_n = \frac{\pi}{10\sqrt{1-\zeta^2}}$

$$\frac{\pi}{10\sqrt{1-\zeta^2}} = \frac{1}{5\zeta} \qquad 5^2\zeta^2\pi^2 = 10^2(1-\zeta^2)$$

$$(25\pi^2+100)\zeta^2 = 100$$

$$\zeta = .5370$$

$$OS = 13.536\%$$