## 第二周：

1. $m = 2450\ kg$

(1) $mg = 4K\delta_{st} \Rightarrow K = \frac{245}{6}\ N/mm$

$c \Rightarrow A_1/A_3 = 10$

$\eta^2 = \frac{A_1}{A_2}\cdot\frac{A_2}{A_3} = 10 \Rightarrow \eta = \sqrt{10}$

$\eta = e^{\zeta w_0 T_d}$

$= e^{\zeta w_0 \frac{2\pi}{w_d}}$

$= e^{\zeta w_0 \frac{2\pi}{\sqrt{1-\zeta^2}w_0}}$

$= e^{\frac{2\pi\zeta}{\sqrt{1-\zeta^2}}} = \sqrt{10} \Rightarrow \delta = \frac{2\pi\zeta}{\sqrt{1-\zeta^2}} = \ln\sqrt{10} = \frac{1}{2}\ln 10$

(2) $\zeta = \frac{c}{2mw_n} \Rightarrow n = \frac{c}{2m} = \zeta w_0$

$w_0 = \sqrt{\frac{K}{m}} = \sqrt{\frac{245}{2.45\times 6}} = 4.082\ rad/s$

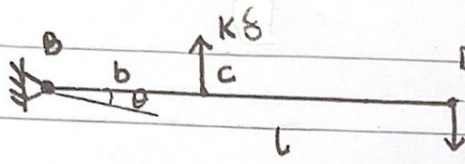
$\delta = \frac{2\pi\zeta}{\sqrt{1-\zeta^2}} = \frac{1}{2}\ln 10 \Rightarrow \zeta = 0.1802$

$n = 0.736$ $\quad \eta = e^{nT_d} = \sqrt{10} \Rightarrow T_d = \frac{\frac{1}{2}\ln 10}{n} = 1.564$

(3) $C_c = 2mw_0 = 20001.8\ (N\cdot s/m)$

2.

$K\delta b = pl$




零势能位置

动能：$T = \frac{1}{2} I_E \dot{\theta}^2$

势能：$V = \frac{1}{2} K\left((\delta + b\theta)^2 - \delta^2\right) - Pl\theta = \frac{1}{2} K (b\theta)^2 + (Kb\delta - Pl)\theta$

$= \frac{1}{2} K (b\theta)^2$

$T_{max} = V_{max}$

$\dot{\theta}_{max} = w_0 \theta_{max}$

$T_{max} = \frac{1}{2} I_E w_0^2 \theta_{max}^2$

$V_{max} = \frac{1}{2} K b^2 \theta_{max}^2$

$w_0 = \sqrt{\frac{V_{max}}{T_{max}}} = \sqrt{\frac{Kb^2}{I_E}}$