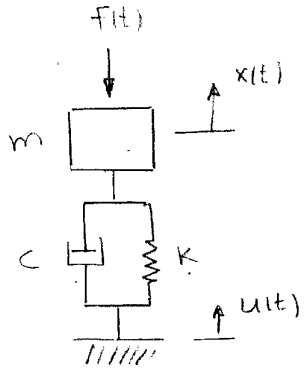
Isolation Table

(a)



$$G(\omega) = \frac{jc\omega + K}{(K - m\omega^2) + jc\omega} = \frac{\omega_n^2 + 2\zeta\omega_n\omega j}{(\omega_n^2 - \omega^2) + j2\zeta\omega_n\omega}$$

$$|G(\omega)| = \sqrt{\frac{\omega_n^4 + (2\zeta\omega_n\omega)^2}{(\omega_n^2 - \omega^2)^2 + (2\zeta\omega_n\omega)^2}}$$

(b) $\omega_n = \sqrt{\frac{K}{m}}$, $K = m\omega_n^2 = 1000(1.5 \times 2\pi)^2 = 8.88 \times 10^4$ N/m

ζ come from the peak amplitude,

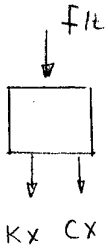
$$|G(\omega_n)| = \sqrt{\frac{1 + 4\zeta^2}{4\zeta^2}} = \sqrt{1 + \frac{1}{4\zeta^2}} = 3 \Rightarrow \zeta^2 = \frac{1}{32}, \quad \underline{\zeta = 0.177}$$

(c) $\omega_1 = 2$ Hz, $|G| = 0.4$

$\omega_2 = 10$ Hz, $|G| = 0.04$

Roll off $= 20\log(0.4) - 20\log(0.04) = 20\log\left(\frac{0.4}{0.04}\right) = 20$ dB

(d)



$\Sigma F = -f(t) - Kx - c\dot{x} = m\ddot{x}$

$m\ddot{x} + c\dot{x} + Kx = -f(t)$

Let $f(t) = F(s)e^{st}$, $x(t) = X(s)e^{st}$

impedance $= Z(s) = \frac{F(s)}{X(s)} = \frac{-s}{ms^2 + cs + K}$

$Z(s)$ has the same poles as transfer function $H(s)$.