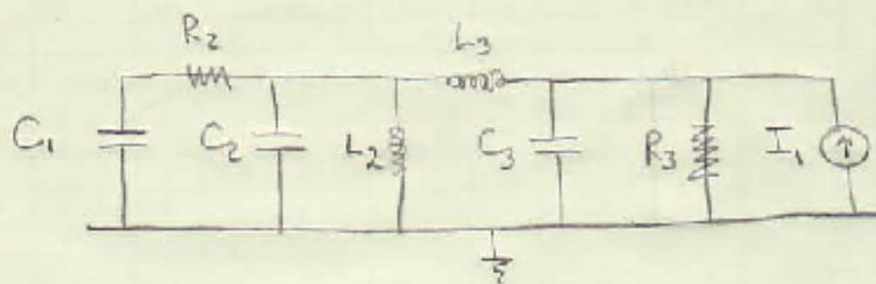


$$\text{E 2.20} \quad T(s) = \frac{B_d s + K_d}{M s^2 + (B_s + B_d)s + K_d} = \frac{0.7 s + 2}{s^2 + 1.5 s + 2}$$

$$\text{P 2.26} \quad \frac{Y(s)}{F(s)} = \frac{\frac{1}{mM}(bs + k)}{s^2[s^2 + (1 + \frac{m}{M})\left(\frac{b}{m}s + \frac{k}{m}\right)]}$$

Electro-Mech H/W Solns

a)



$$C_1 = M_1$$

$$C_2 = M_2$$

$$C_3 = M_3$$

$$R_2 = 1/B_2$$

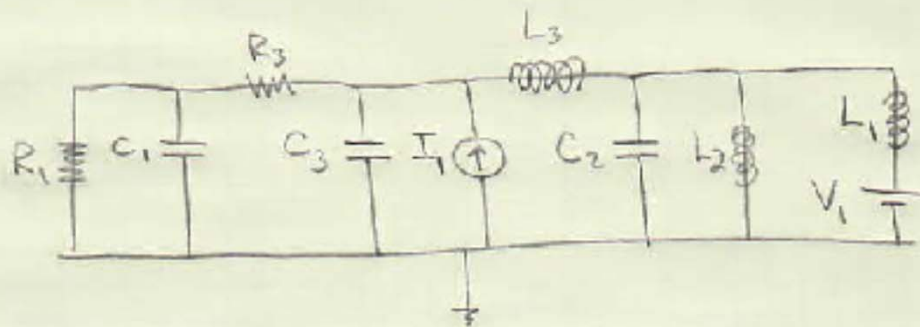
$$R_3 = 1/B_3$$

$$L_2 = 1/K_2$$

$$L_3 = 1/K_3$$

$$I_1 = F_1$$

b)



$$C_1 = M_1$$

$$C_2 = M_2$$

$$C_3 = M_3$$

$$R_1 = 1/B_1$$

$$R_3 = 1/B_3$$

$$L_1 = 1/K_1$$

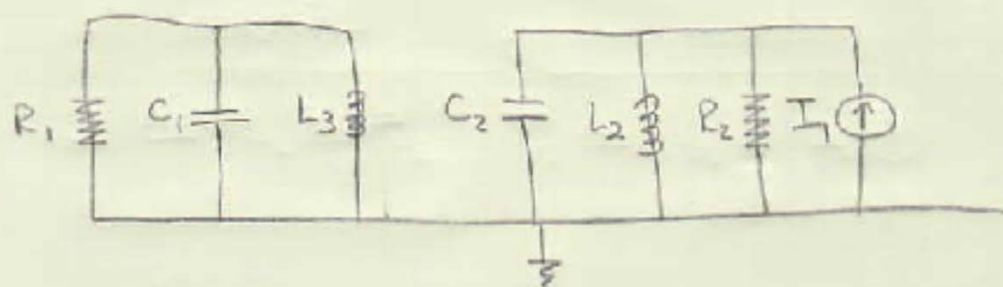
$$L_2 = 1/K_2$$

$$L_3 = 1/K_3$$

$$I_1 = F_1$$

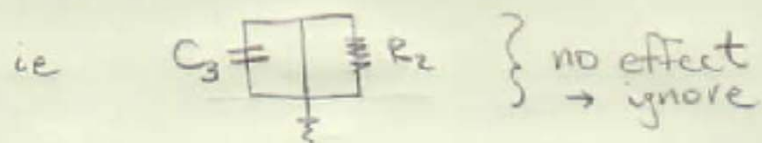
$$V_1 = V_1$$

c)

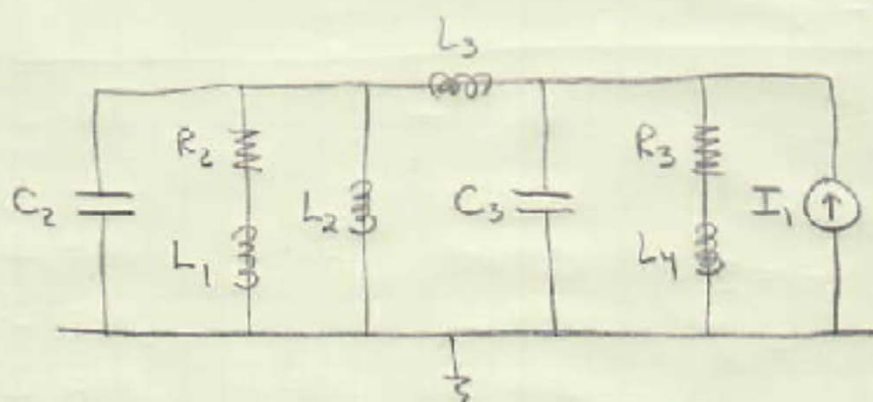


$$\begin{aligned}
 C_1 &= M_1 & R_1 &= 1/B_1 & I_1 &= F_1 \\
 C_2 &= M_2 & R_2 &= 1/B_2 & L_2 &= 1/K_2 \\
 & & & & L_3 &= 1/K_3
 \end{aligned}$$

Note: M_3 is connected to gnd

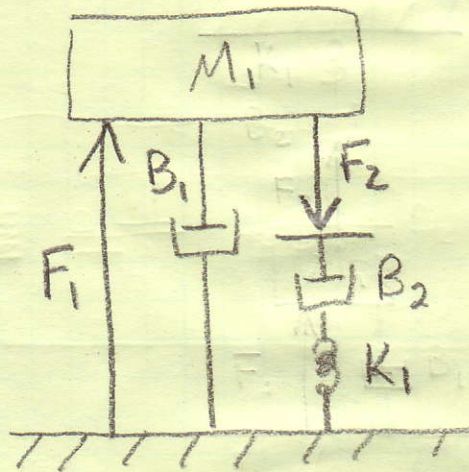


d)



$$\begin{aligned}
 C_2 &= M_2 & R_2 &= 1/B_2 & L_1 &= 1/K_1 & I_1 &= F_1 \\
 C_3 &= M_3 & R_3 &= 1/B_3 & L_2 &= 1/K_2 \\
 & & & & L_3 &= 1/K_3 \\
 & & & & L_4 &= 1/K_4
 \end{aligned}$$

2a)



$$B_1 = 1/R_1$$

$$B_2 = 1/R_2$$

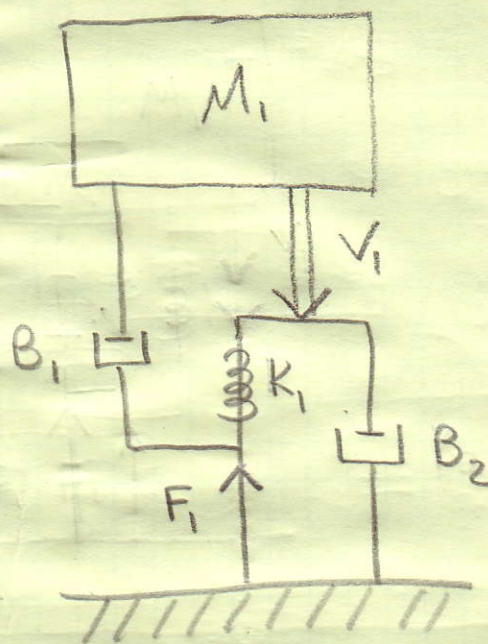
$$K_1 = 1/L_1$$

$$M_1 = C_1$$

$$F_1 = I_1$$

$$F_2 = I_2$$

b)



$$B_1 = 1/R_1$$

$$B_2 = 1/R_2$$

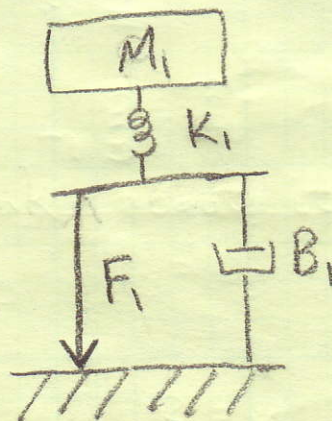
$$K_1 = 1/L_1$$

$$M_1 = C_1$$

$$V_1 = V_1$$

$$F_1 = I_1$$

c)



$$M_1 = C_1$$

$$K_1 = 1/L_1$$

$$B_1 = 1/R_1$$

$$F_1 = I_1$$

Not the only possible solution

What is the other one?