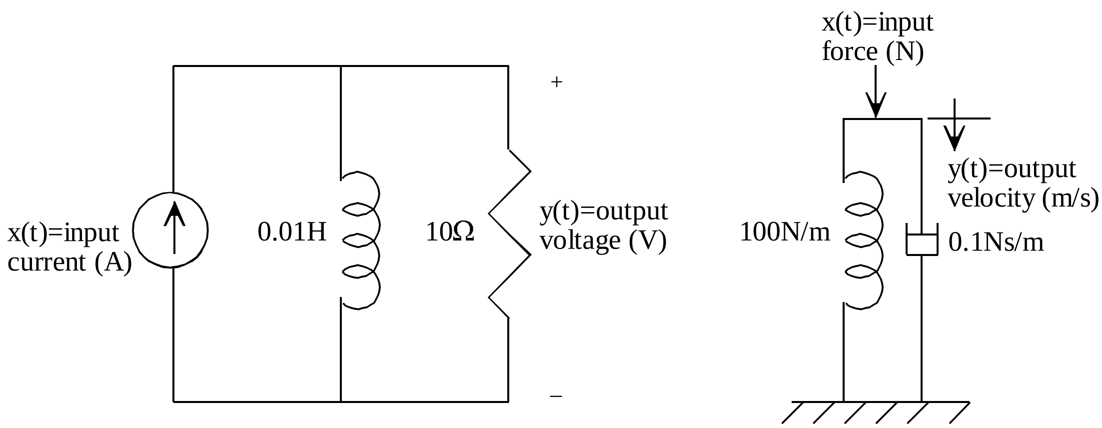
EE341.01 **PS9** **DUE 11/06/98**

1. Do textbook problems **4.21a,b,c, 4.24a, 5.1, 5.2, 5.6**. Note that amplitude and phase spectra of periodic signals are plotted as $|c_n|$ versus ω and $\angle c_n$ versus ω, respectively, while the amplitude and phase spectra of aperiodic signals are plotted as $|X(\omega)|$ versus ω and $\angle X(\omega)$ versus ω, respectively.

2. Consider either the electrical or mechanical system (choosing one to work with) below where x(t) represents the system input and y(t) represents its output.



a) Find a differential equation relating only x(t) and y(t).

b) Determine the frequency function H(ω) (the Fourier transform of the impulse response h(t)) from relationship found in part a.

c) Plot the magnitude and phase spectra of H(ω).

d) Find y(t) when

$$x(t) = 2 + \cos(0.5t + 0.1\text{rad}) + \cos(50t + 0.2\text{rad}) + \cos(5000t + 0.3\text{rad}).$$

e) Plot x(t) and y(t) choosing your range of time values so that a good view of the signals is achieved.

f) Examine your answers to parts c,d,e above and comment on what the system is doing to the input signal.