Concordia University

Department of Computer Science & Software Engineering

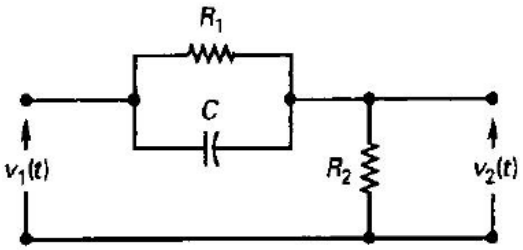
SOEN 385

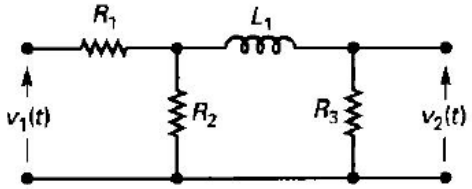
Control Systems and Applications

Assignment No. 1

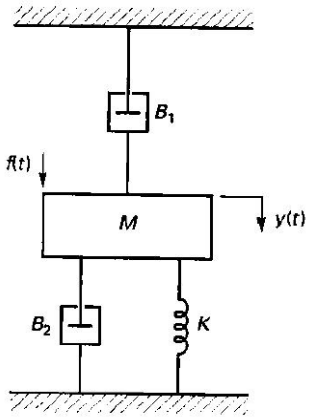
Due date: February 5, 2015

1) For each of the circuits shown below find the voltage transfer function $V_2(s) / V_1(s)$:

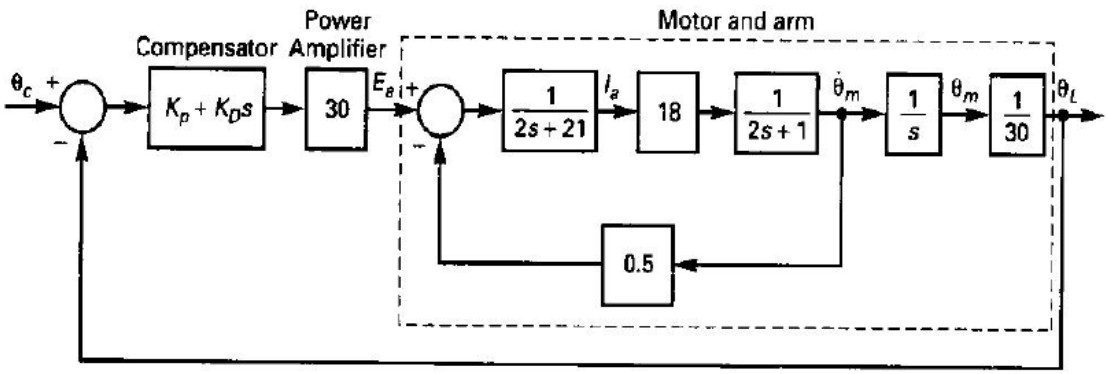




2) Consider the mechanical system in the figure below
   a) Write the differential equations that describe this system.
   b) Find the transfer function from the applied force *f(t)* to the displacement *y(t)* of the mass, that is find Y(s) / F(s).



3) Shown in the figure below is the block diagram of the servo-control system for one of the joints of a robot.
   a) Find the plant transfer function $\theta_L(s) / E_a(s)$
   b) Find the closed loop system transfer function $\theta_L(s) / \theta_c(s)$
   c) Find the transfer function from the system input $\theta_c(s)$ to the motor armature voltage $E_a(s)$ for the closed loop system.



4) Use the Laplace transform tables to find the tfansforms of each function below:
   a) $F(t) = -3te^{-t}$
   b) $F(t) = -5\cos t$
   c) $F(t) = 5\cos(4t+30^0)$
   d) Verify all the results with Matlab

5) Find the inverse Laplace transform of each
   a) $F(s) = 5/[s(s+1)(s+2)]$
   b) $F(s) = (2s+1)/(s^2+2s+10)$
   c) Verify the results with Matlab.