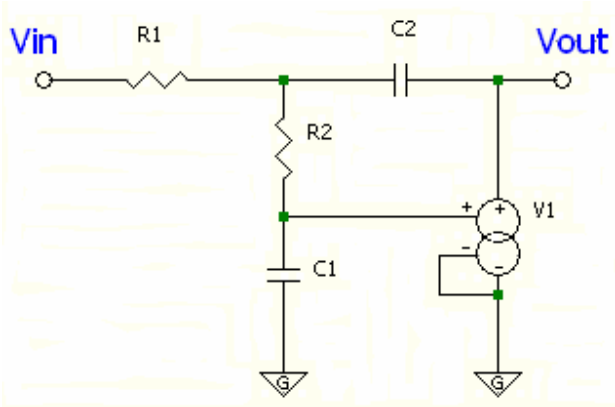
EEE 202-CIRCUIT THEORY
SOFTWARE LAB #9
s-DOMAIN CIRCUIT ANALYSIS

EXPERIMENTAL WORK (100%):

The transfer function of the following circuit, when R1=R2=R and C1=C2=C is given by:

$$T_v(s) = \frac{\mu}{R^2C^2s^2 + RC(3-\mu)s + 1}$$



The V_1 in the figure is voltage controlled voltage source and μ in the transfer function defines the parameter voltage gain (Volts/Volt) of the V_1.

Select values for R, C and μ, such that the natural poles of the given circuit are:

(i) Real and distinct and lie on the LHS of the s-plane (2 cases);
(ii) Real and distinct and lie on the RHS of the s-plane (2 cases);
(iii) Complex conjugate and lie on the LHS of the s-plane (2 cases);
(iv) Complex conjugate and lie on the RHS of the s-plane (2 cases);
(v) Complex conjugate and lie on the imaginary axis of the s-plane (2 cases);

For each of the above cases, simulate the circuit in 5Spice and plot the output waveform for each of the following inputs:

a. $V_{in}(t)=u(t)$
b. $V_{in}(t)=\cos(\beta t)$ – Select β such that the effect of both the natural and the forced solutions can be observed on the output waveform.

Submit your observations in the form of a report. Your report must include the plot of the poles in the s-plane, indicate whether the circuit is overdamped, underdamped or critically damped and the plot of the output waveform along with comments for each of the cases.