

EE2008 Circuits (Part 1) – Take-Home Project

- Please copy the following statement on the cover page of your project report. You will have to sign under this statement in order to receive a grade for the project.

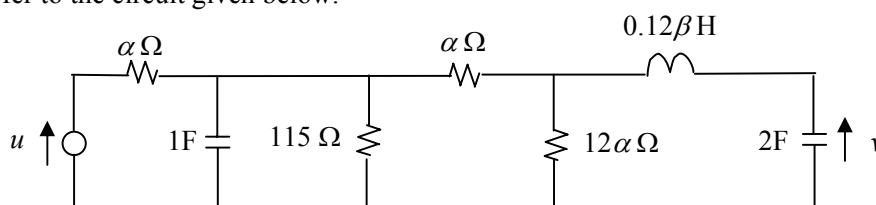
I have neither given nor received aid from others in this take-home project.

- Identify your EE2008 lucky parameters α and β using the following table:

A=13	B=12	C=11	D=10	E=09	F=08	G=07	H=06	I=05	J=04	K=03	L=02	M=01
N=14	O=15	P=16	Q=17	R=18	S=19	T=20	U=21	V=22	W=23	X=24	Y=25	Z=26

α = the corresponding value for the first letter of your family name and β = the value for the first letter of your given name. For example, the EE2008 lucky parameters for Ben M. Chen are $\alpha = 11$ and $\beta = 12$.

- Please refer to the circuit given below.



Assume that the both capacitors are initially charged to -0.2V and the inductor is charged to 3A .

- Derive the state equation and output equation for the given circuit with the input being the voltage source u and the output being v .
- Calculate the transfer function of the system obtained in Part (a). What are the poles of the system? Is the system stable? Why?

Hint: Check the functions `ss2tf` and `roots` in MATLAB to see what they can help.

- Derive the zero input response, and the complete response due to an input signal $u = 1\text{V}$. Draw both responses using MATLAB. Verify your results using MATLAB function `step`.
- Using SIMULINK, simulate the system output responses for the following input signals:

- $u = \sin(0.05t) \text{ V}$
- $u = \cos(0.2t) \text{ V}$
- $u = \sin(0.5t) \text{ V}$
- $u = 1 + \sin(0.05t) + \cos(0.2t) + \sin(0.5t) \text{ V}$

Provide your SIMULINK block and plot all simulation results in your report. What have you observed from the responses to the above input signals? Any comments?

- Hand in your report to the tutor of your tutorial session in 3 weeks after the completion of the first part lectures.

Ben M. Chen
Course Instructor