



*King Fahd University of Petroleum & Minerals*  
*Department of Electrical Engineering*  
**EE-205 Electric Circuits II**

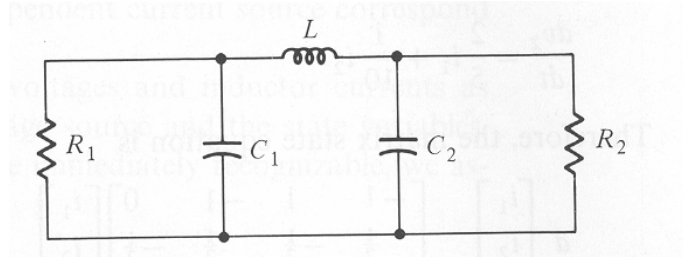
Exam: II  
Date : Dec. 24, 2005  
Place: Bldg. 14 Room 108  
Time: 6:30 – 7:50 pm

Student Name	:	
Student ID	:	Sec. No.
Instructor	:	Dr. Abdelmalek ZIDOURI

Problem 1	Problem 2	Problem 3 or 4	Total/20

**Problem I (7pnts):**

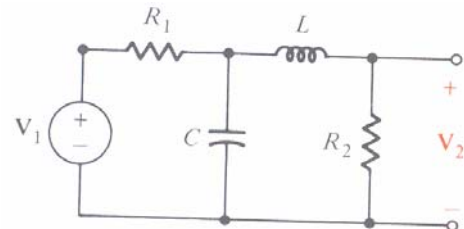
Write the matrix state equation for the circuit below.



**Problem III (7pnts):**

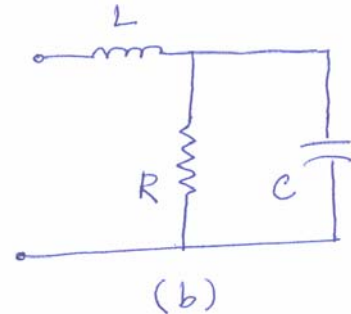
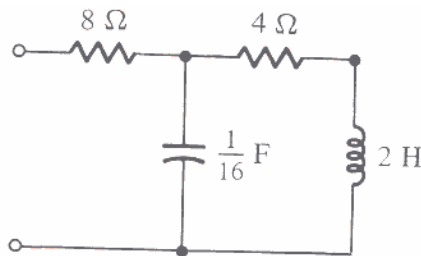
For the circuit below, take:  $R_1 = 8\Omega$ ,  $R_2 = 4\Omega$ ,  $L = 2\text{ H}$ ,  $C = \frac{1}{16}\text{ F}$

- a) Draw the equivalent circuit in the s-domain.
- b) Determine  $\mathbf{H}(s) = V_2/V_1$
- c) Draw the pole-zero plot of  $\mathbf{H}(s)$ .



**Problem II (6pnts):**

- a) Find the resonance frequency for each of the circuits shown below.
- c) Find the quality factor for the circuit in (a)



**Problem IV (6pnts):**

The linear transformer below couples a load  $Z_L$  composed of  $300\Omega$  resistor in series with a  $0.25\text{H}$  inductor to a sinusoidal voltage source  $V_s=300\text{ V}_{\text{rms}}$  at a frequency  $\omega$  of  $800\text{ rad/sec}$ . The internal impedance of the source  $Z_s = 180 + j0\Omega$ .

The transformer has the following parameters. ( $R_1=105\Omega$ ,  $R_2=40\Omega$ ,  $L_1=0.5\text{H}$ ,  $L_2=0.12\text{H}$  and  $k=0.5$ )

- a) **Construct** the **frequency domain** equivalent circuit
- b) Calculate the **self impedance** of the **primary** circuit
- c) Calculate the **self impedance** of the **secondary** circuit
- d) Calculate the **reflected impedance**  $Z_r$ .

