ECE 2202 – CIRCUIT ANALYSIS II

HOMEWORK #7

1. In the circuit given, the voltage source *vS(t)* is made up of the summation of several frequency components. The circuit is operating in steady state.

1. Find the Thévenin impedance as seen by the load, *RL*, as a function of the angular frequency, **.
2. Find the Thévenin impedance as seen by the load, *RL*, at 1[kHz].



2. A device was connected to a resistor and capacitor, as shown in Figure 1, and the steady-state voltage that resulted was

.

The same device was then removed from that circuit, and was connected to a resistor and inductor, as shown in Figure 2. The steady-state current that resulted was

.

Next, the same device was removed from that circuit, and was connected to a resistor, as shown in Figure 3. Find the steady-state value of *vW(t)*.





3. The circuit shown operates in steady-state. Find the numerical expression for the current *iQ(t)*.





4. For the circuit shown below:

a) Find the expression for the steady-state current *i(t)*, as a function of *R*.

b) Find the expression for the steady-state current *i(t)*, for *R* equal to 500[], 1[k], 2[k], and 4[k]. (PWA8, No. 1)



5. In the circuit below, find the nonzero frequency at which the voltage *vS(t)* is in phase with the current *iS(t)*. Problem adapted from (PEQWS8, No. 9).



6. The circuit given is in steady-state. The current through an unknown device, *iD(t)* has been measured, and its expression is given with the figure.

a) Find the expression for the steady-state voltage *vD(t)*.

b) Find a circuit model in the time domain, including values for the model parameters, for the unknown device. Assume that it is a passive device. (PWA8, No. 2)



7. The circuit given is in steady-state. Find a numerical expression for the steady-state current, *i(t)*. (PWA8, No. 3)



Selected Numerical Solutions

1. a) Solution omitted, b) 66.5 + 0.203j[]

2. 45.2 cos(500[rad/s]*t* + 12.4°)[V]

3. 387 cos(30[rad/s]t – 17°)[mA]

4. Solution omitted

5. Solution omitted

6. Solution omitted

7. Solution omitted