

EE 111 Homework 6

Due date: May. 15th, 2019

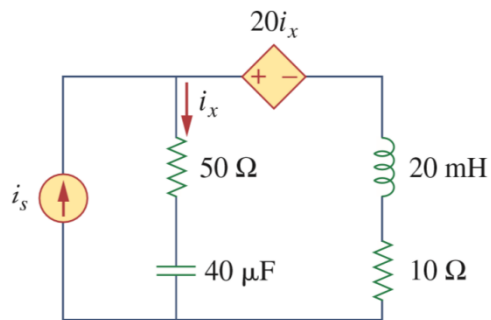
Turn in your homework in class

Rules:

- Work on your own. Discussion is permissible, but similar submissions will be judged as plagiarism.
- Please show all intermediate steps: a correct solution without an explanation will get zero credit.
- Please submit on time. No late submission will be accepted.
- Please prepare your submission in English only. No Chinese submission will be accepted.

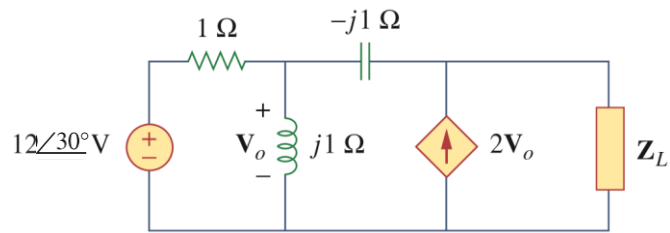
1. Instantaneous and Average Power

For the circuit, $i_s = 3\cos 2 \times 10^3 t$ A. Find the average power absorbed by the 50Ω resistor.



2. Maximum Average Power Transfer

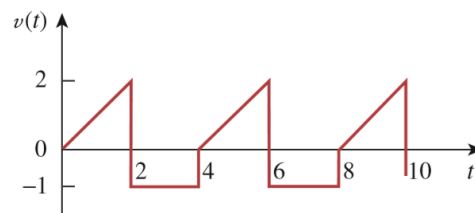
In the circuit, find the value of Z_L that will absorb the maximum power and the value of the maximum power. (note: the voltage is V_m).



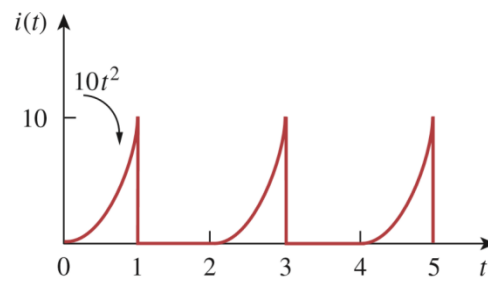
3. Effective or RMS Value

Compute the RMS value of the waveform depicted in the figures.

(1)

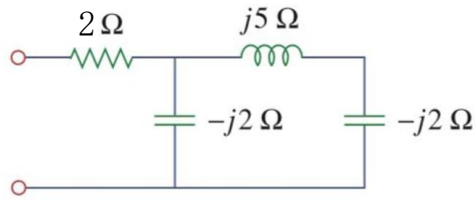


(2)

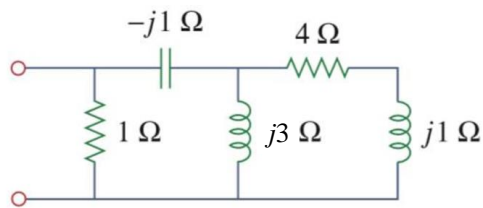


4. Apparent Power and Power Factor

Obtain the power factor for each of the circuits. Specify each power factor as leading or lagging.



(a)

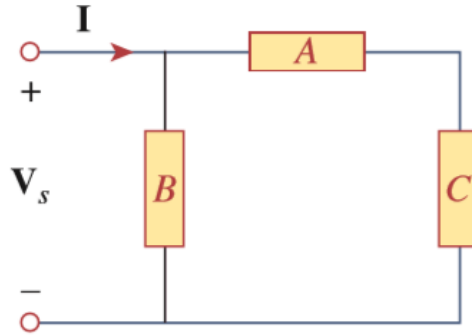


(b)

5. Complex Power

In the circuit, device A receives 2 kW at 0.8 pf lagging, device B receives 3 Kva at 0.8pf leading, while device C is inductive and consumes 1 kW and receives 7500 VAR.

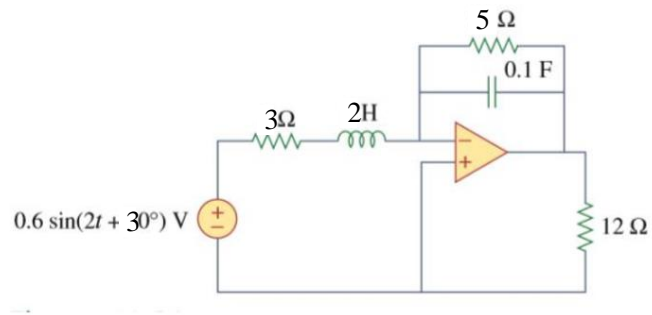
- (a) Determine the power factor of the entire system;
(b) Find \mathbf{I} given that $V_s = 120\angle 45^\circ \text{ V rms}$.



6. Power Factor

For the op amp circuit, calculate:

- (a) the complex power delivered by the voltage source;
- (b) the average power dissipated in the 12Ω resistor.



7. Balanced Three-Phase Voltages

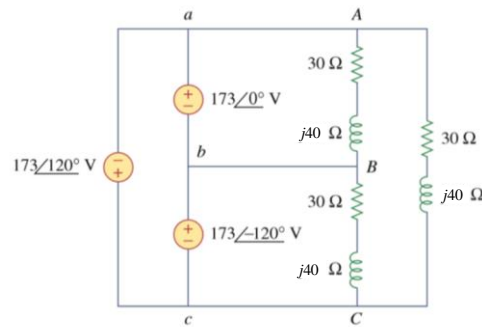
A balanced Y-Y four-wire system has phase voltages

$$V_{an} = 120\angle 0^\circ \text{ V}, V_{bn} = 120\angle -120^\circ \text{ V}, V_{cn} = 120\angle 120^\circ \text{ V}$$

The load impedance per phase is $19 + j13 \, \Omega$, and the line impedance per phase is $1 + j2 \, \Omega$. Solve for the line currents and neutral current.

8. Balanced Delta-Delta Connection

For the $\Delta - \Delta$ circuit, calculate the phase and line currents.



9. Balanced Delta-Wye Connection

In the circuit, if $V_{ab} = 440\angle 0^\circ V$, $V_{bc} = 440\angle -120^\circ V$, $V_{ca} = 440\angle 120^\circ V$ find the line currents.

