

CS1025

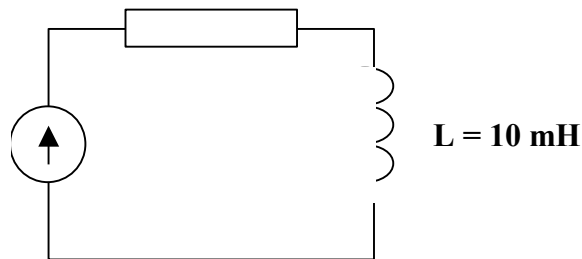
Problem Sheet 4

Q1

Calculate the voltage across each the resistor and the inductor in the following circuit where:

$$i(t) = 5 \sin(1000\pi t + \pi/3)$$

$$R = 100 \text{ Ohms}$$



What is the total voltage across the load?

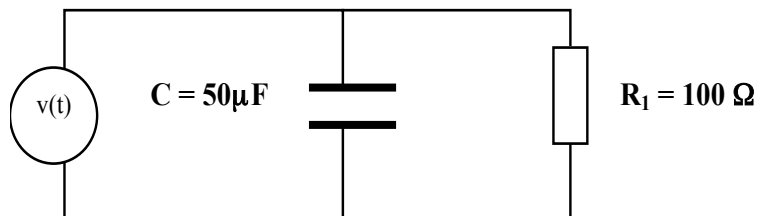
What is the total voltage at time $t = 0.02 \text{ s}$?

What is the frequency of the applied current?

Q2

Calculate the current in each branch of the following circuit where:

$$v(t) = 20 \cos(1000\pi t + \pi/4)$$

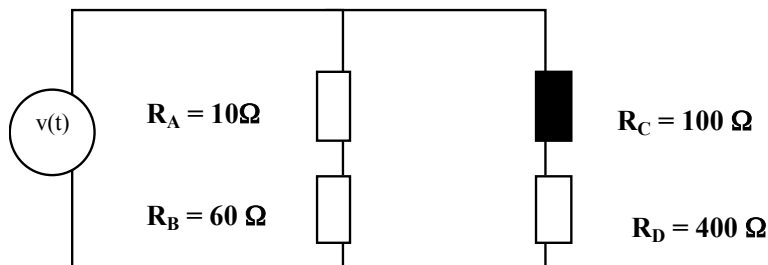


What is the total current in the circuit? Is the total current leading or lagging the voltage?

Q3.

Calculate the voltage across R_C in the following circuit? Calculate the current in each branch.

$$v(t) = 10 \cos(500\pi t + \pi/6)$$



Q4 An electronic flash gun has a 2000- μF storage capacitor. It is charged to 48 volts for action. The flash duration in use is 1/1000 s.

- Find the charge on the capacitor and the energy stored.
- Find the current through the flash tube and the power delivered to the tube.
- After the flash the capacitor must be recharged. How long does it take if the charging supply delivers a current of 100 mA.

Q5 A voltage source is defined by the following equation:

$$v(t) = 10 \sin(1000\pi t + \pi/3)$$

Calculate the peak voltage, the peak to peak voltage, the rms voltage and the average voltage. What is the period of the voltage. What is the phase of the voltage at time $t=0$ and at $t = .02$ secs? Rewrite the expression for the voltage source in terms of the cosine function.

Q6

What is the potential difference across two series inductors 50 mH and 120 mH, if the current in the circuit has a peak to peak value of 20 amps, a frequency of 100 Hz and the magnitude of the current at time $t=0$ is 10.

Q7 Plot the variation of the following voltage sources with time on the same axes. Graph paper is supplied.

$$v_1(t) = 10 \sin(500\pi t + \pi/2)$$

$$v_2(t) = 20 \cos(500\pi t - \pi)$$

Does voltage 1 lead or lag voltage 2?