Chapter 4 AC circuit

1. Given the sinusoidal voltage find: (a) the amplitude Vm, (b) the period T, (c) the frequency f.

Solution：

(a) The amplitude Vm equals to 50 V;

(b) , so, the period of T equals to ;

(c) The frequency is 4.8Hz.

1. Express the following functions in cosine form:

(1)

(2)

Solution: AC sinusoid is always expressed as Am is referred to the peak value of the signal; is referred to the angualar frequency and is the phase shift. So, we need to transfer these two sine forms into the typical cosine form.

(1)

(2)

1. For the following a pair of sinusoid, determine which one leads and by how much.

Solution:

is not in a typical form of AC expression, it should be tranformed as

So, leads forward by

1. Find current i in the circuit of Fig.4-1, when V.

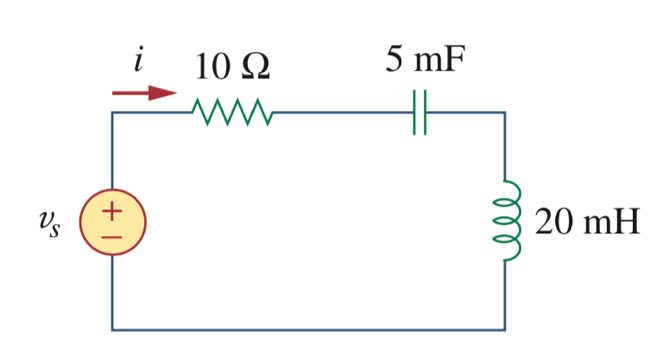


Figure 4-1

Solution:

The reactance of capacitor XC and reactance of inductor XL are respectively,

The impedence of the RLC serie circuit is

The current i equals to

Or

1. Calculate the capacitor voltage for t < 0 and t > 0 in Figure 4-2.

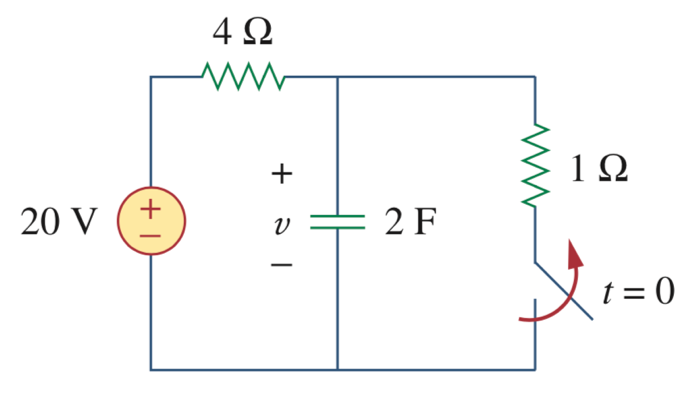


Figure 4-2

Solution:

(1) The switch is off when t = 0, so before the change the circuit is in steady state. The voltage across the capacitor equals to the resistor.

(2) As the switch turns off at zero time point, the voltage of capacitor can not change abruptly, so

1. After a long period of time Vc should be equal to voltage source, so
2. The time constant

By the three elements, we could defer the as,