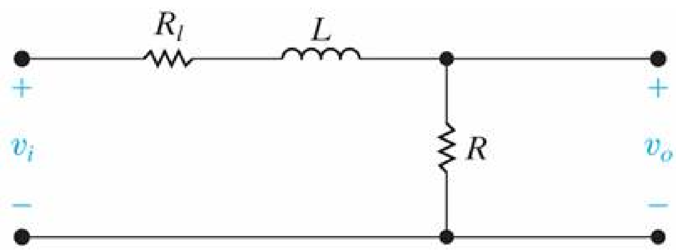
Started on	Wednesday, 10 April 2019, 11:37 AM
State	Finished
Completed on	Wednesday, 10 April 2019, 11:38 AM
Time taken	33 secs
Grade	**100.00** out of 100.00

Question 1

Correct

Mark 20.00 out of 20.00



P14.3_9ed

A resistor R_l is added in series with the inductor in this circuit.

Given: $R_l = 75\ \Omega$ (Ohm) $L = 10$ mH (mill H) $R = 127\ \Omega$ (Ohm)

a) Find the s domain transfer function $H(s) = V_0/V_i$.

$H(s) =$ 12700 / (s + 20200)

b) At what frequency will the magnitude of H(jw) be maximum?

$w_{H,max} =$ 0 rad/sec

c) What is maximum value of the magnitude of H(jw)?

$H(jw)_{max} =$ .628

d) At what frequency will the magnitude of H(jw) equal its maximum value divided by square root of 2?

$w_{H,max,sqrt(2)} =$ 20200 rad/sec

e) Find w_c (omega$_c$)

$w_c =$ 20200 rad/sec

Now examine the transfer function magnitude and phase as the frequency varies.

f) Find H(jw = 0) in polar form..

H(jw = 0) = Mag .628 at angle 0 ° (Degrees)

g) Find H(jw = 0.3w_c) in polar form.

H(jw = 0.3w_c) = Mag .602 at angle -16.7 ° (Degrees)

h) Find H(jw = w_c) in polar form.

H(jw = w_c) = Mag .44 at angle -45 ° (Degrees)

i) Find H(jw = 3w_c) in polar form.

H(jw = 3w_c) = Mag .198 at angle -72 ° (Degrees)

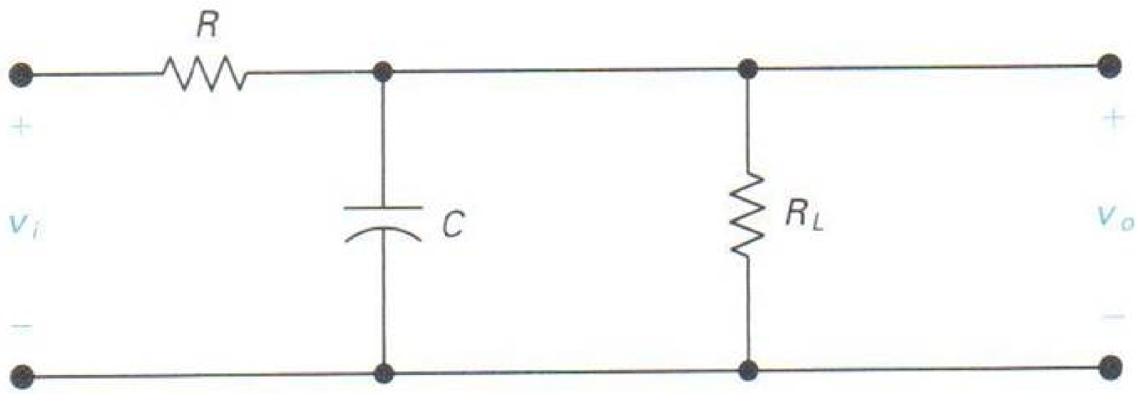
Correct

Marks for this submission: 20.00/20.00.

Question 2

Correct

Mark 20.00 out of 20.00



P14.3_6ed

A resistor R_L is connected in parallel with the capacitor in this circuit. The circuit thus becomes a loaded low-pass filter.

Given: R = 20 kΩ (kilo Ohm) C = 4 nF R_L = 300 kΩ (kilo Ohm)

a) Find the s domain transfer function $H(s) = V_0/V_i$.

H(s) = 12500 / (s + 13333)

b) Find w_c (omega_c)

w_c = 13333 rad/sec

Now examine the transfer function magnitude and phase as the frequency varies.

c) Find H(j0)

H(j0) = .9375

d) Find $H(jw_c)$ i.e. evaluate H(jw) at $w = w_c$

$H(jw_c)$ = Mag .66 Angle -45

e) Find $H(j0.2w_c)$ i.e. evaluate H(jw) at $w = 0.2\ w_c$

$H(j0.2w_c)$ = Mag .91 Angle -11.3

f) Find $H(j8w_c)$ i.e. evaluate H(jw) at $w = 8w_c$

$H(j8w_c)$ = Mag .116 Angle -83

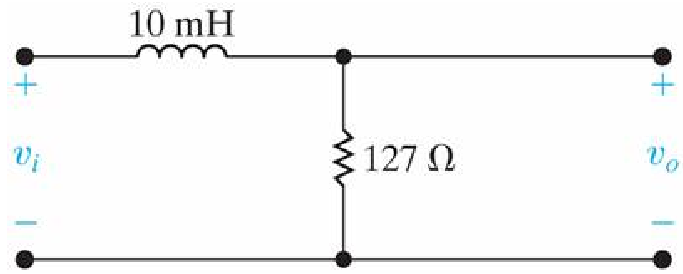
Correct

Marks for this submission: 20.00/20.00.

Question 3

Correct

Mark 20.00 out of 20.00



P14.1_9ed

a) Find the cutoff frequency in hertz.

f_c = 2022 Hz

b) Find H(jω = 0) in polar form.

H(jw = 0) = Mag 1 at angle 0 ° (Degrees)

Now examine the output magnitude and phase as the input frequency varies.

c) Find H(jw = $0.2\omega_c$) in polar form..

H(jw = $0.2\omega_c$) = Mag .98 at angle -11.3 ° (Degrees)

d) Find H(jω = ω_c) in polar form.

H(jω = ω_c) = Mag .707 at angle -45 ° (Degrees)

e) Find H(jω = $5\omega_c$) in polar form.

H(jw = $5\omega_c$) = Mag .196 at angle -78.7 ° (Degrees)

Now given $v_i(t)$ = 10 cos(ω t) V. Write the steady-state expression for v_0 for:

f) $\omega = 0.2\omega_c$

$v_0(t)$ = 9.8 cos(2540 t + -11.3 °) Volts

g) $\omega = \omega_c$

$v_0(t)$ = 7.07 cos(12700 t + -45 °) Volts

h) $\omega = 5\omega_c$

$v_0(t)$ = 1.96 cos(63500 t + -79 °) Volts

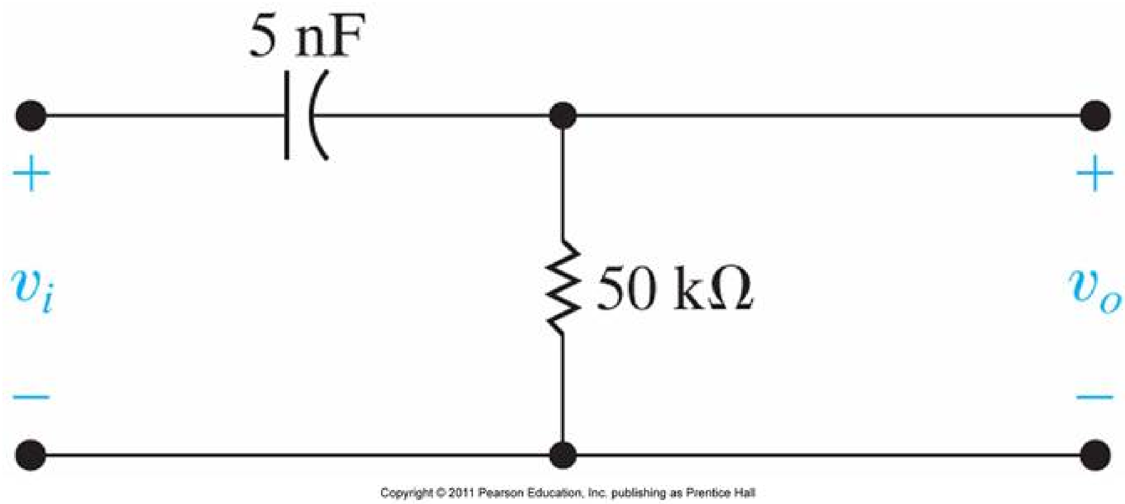
Correct

Marks for this submission: 20.00/20.00.

Question 4

Correct

Mark 20.00 out of 20.00



P14.10_9ed

a) Find the cutoff frequency f_c for this high-pass filter.

f_c = 636.6 ✓ Hz

b) Find the H(jw) for

H(jw = w_c) = .707 ✓ at angle 45 ✓ ° (degrees)

H(jw = 0.2w_c) = .196 ✓ at angle 79 ✓ °

H(jw = 5w_c) = .98 ✓ at angle 11.3 ✓ °

c) If v_i(t) = 500 cos(ωt) mV (milli V), write the steady-state output voltage v_o(t) for

For ω = ω_c, v_o(t) = 353 ✓ cos(wt + 45 ✓ °) mV (milli V)

For ω = 0.2ω_c, v_o(t) = 98 ✓ cos(wt + 78.69 ✓ °) mV (milli V)

For ω = 5ω_c, v_o(t) = 490 ✓ cos(wt + 11.3 ✓ °) mV (milli V)

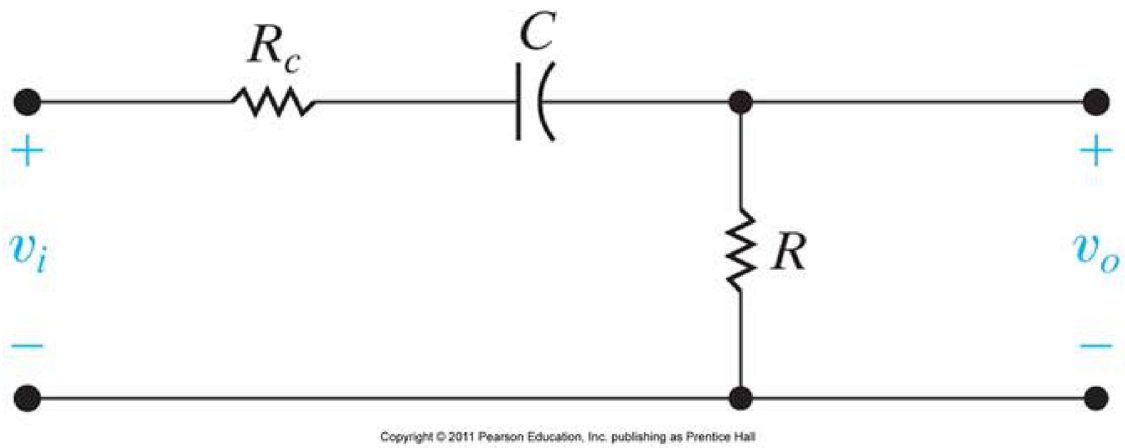
Correct

Marks for this submission: 20.00/20.00.

Question 5

Correct

Mark 20.00 out of 20.00



P14.11_9ed

Given: R_c = 12.5 kΩ (kilo Ohm) C = 5 nF R = 50 kΩ (kilo Ohm)

a) Find the cutoff frequency f_c for this high-pass filter.

f_c = 509 ✓ Hz

b) Find the H(jw) for

$H(jw = w_c)$ = .56 ✓ at angle 45 ✓ ° (degrees)

$H(jw = 0.2w_c)$ = .157 ✓ at angle 79 ✓ °

$H(jw = 5w_c)$ = .78 ✓ at angle 11.4 ✓ °

c) If $v_i(t) = 500 \cos(\omega t)$ mV (milli V), write the steady-state output voltage $v_o(t)$ for

For $\omega = \omega_c$, $v_o(t)$ = 282 ✓ cos(wt + 45 ✓ °) mV (milli V)

For $\omega = 0.2\omega_c$, $v_o(t)$ = 78.4 ✓ cos(wt + 79 ✓ °) mV (milli V)

For $\omega = 5\omega_c$, $v_o(t)$ = 392 ✓ cos(wt + 11.31 ✓ °) mV (milli V)

Correct

Marks for this submission: 20.00/20.00.

◄ Homework 10 - Bode Diagrams

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Homework 12 - Chapter 14 ►