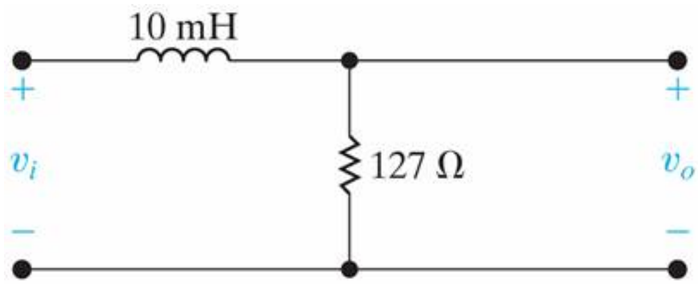
Started on	Saturday, 8 April 2017, 1:38 PM
State	Finished
Completed on	Thursday, 13 April 2017, 6:05 PM
Time taken	5 days 4 hours
Grade	**100.00** out of 100.00

Question 1

Correct

Mark 20.00 out of 20.00



P14.1_9ed

a) Find the cutoff frequency in hertz.

f_c = 2021.27 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 = 0.2ω_c) in polar form..

H(jw = 0.2ω_c) = Mag 0.981 at angle -11.31 ° (Degrees)

d) Find H(jω = ω_c) in polar form.

H(jω = ω_c) = Mag 0.7071 at angle -45 ° (Degrees)

e) Find H(jω = 5ω_c) in polar form.

H(jw = 5ω_c) = Mag 0.196 at angle -78.69 ° (Degrees)

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

f) ω = 0.2ω_c

$v_0(t)$ = 9.81 cos(2540 t + -11.31 °) Volts

g) ω = ω_c

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

h) ω = 5ω_c

$v_0(t)$ = 1.96 cos(63500 t + -78.69 °) Volts

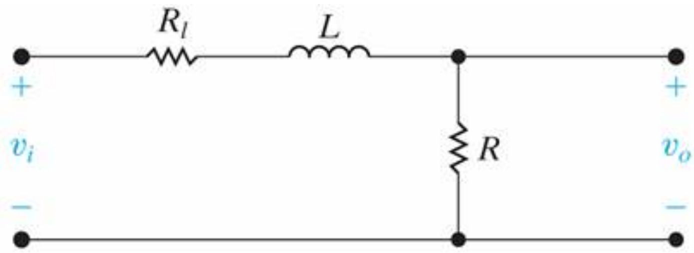
Correct

Marks for this submission: 20.00/20.00.

Question **2**

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 Ω (Ohm) L = 10 mH (mill H) R = 127 Ω (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)?

$H(jw)_{max}$ = 0.6287

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

$w_{H,max,sqrt(2)}$ = 20160.7 rad/sec

e) Find w_c (omega$_c$)

w_c = 20160.7 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 0.6287 at angle 0 ° (Degrees)

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

$H(jw = 0.3w_c)$ = Mag 0.6022 at angle -16.70 ° (Degrees)

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

$H(jw = w_c)$ = Mag 0.446 at angle -45 ° (Degrees)

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

$H(jw = 3w_c)$ = Mag 0.1988 at angle -71.57 ° (Degrees)

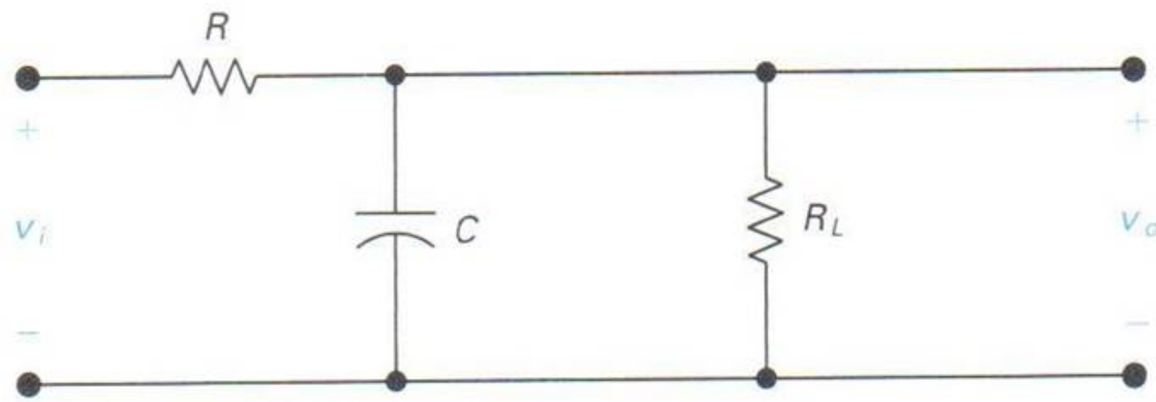
Correct

Marks for this submission: 20.00/20.00.

Question 3

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 + 13333.33)

b) Find w_c ($omega_c$)

w_c = 13333.33 rad/sec

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

c) Find H(j0)

H(j0) = 0.9375

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

$H(jw_c)$ = Mag 0.6629 Angle -45

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

$H(j0.2w_c)$ = Mag 0.9193 Angle -11.31

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

$H(j8w_c)$ = Mag 0.1163 Angle -82.87

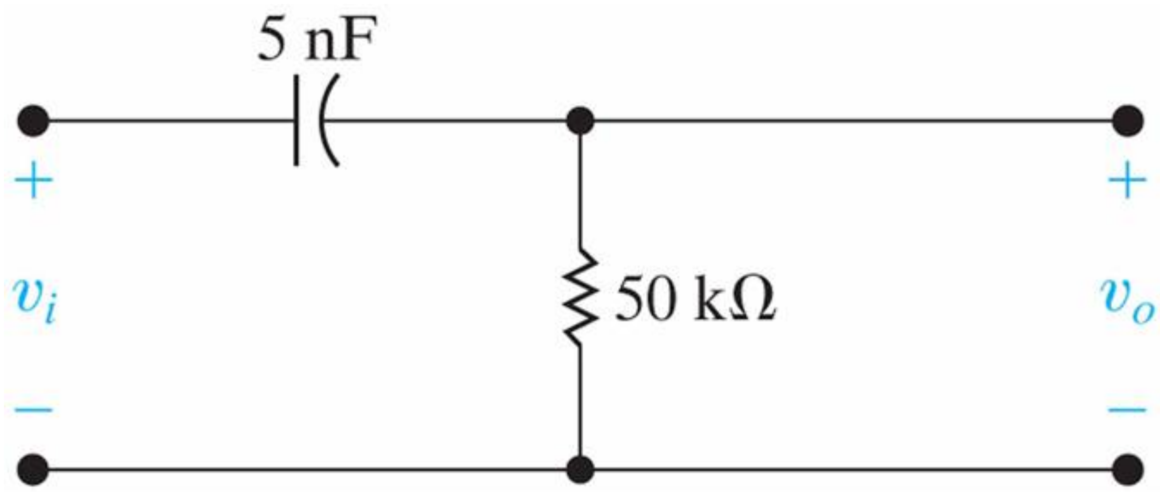
Correct

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 = 636.62 ✓ Hz

b) Find the H(jw) for

H(jw = w_c) = 0.707 ✓ at angle 45 ✓° (degrees)

H(jw = 0.2w_c) = 0.196 ✓ at angle 78.69 ✓°

H(jw = 5w_c) = 0.98 ✓ at angle 11.3 ✓°

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

For $\omega = \omega_c$, $v_o(t)$ = 353.5 ✓ cos(wt + 45 ✓°) mV (milli V)

For $\omega = 0.2\omega_c$, $v_o(t)$ = 98 ✓ cos(wt + 78.69 ✓°) mV (milli V)

For $\omega = 5\omega_c$, $v_o(t)$ = 490 ✓ cos(wt + 11.3 ✓°) mV (milli V)

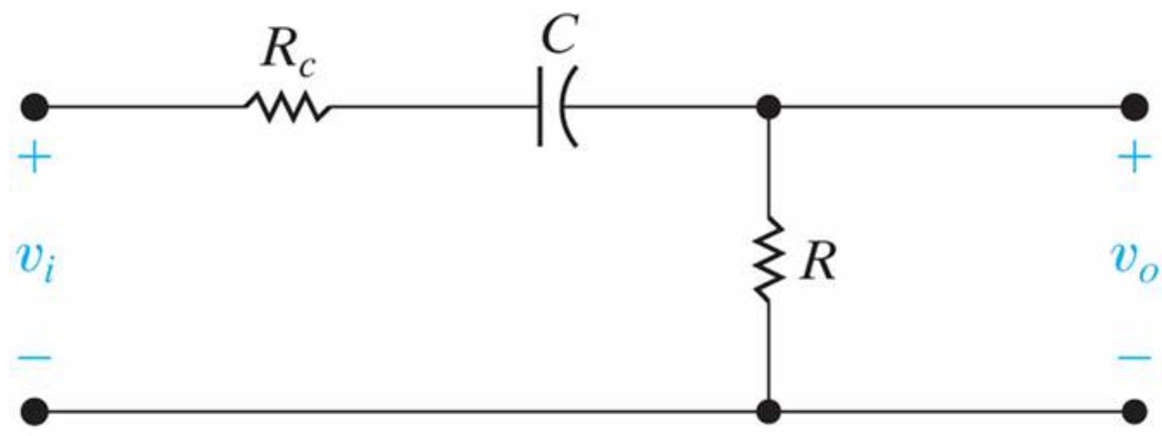
Correct

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 = 509.3 Hz

b) Find the H(jw) for

H(jw = w_c) = 0.565 at angle 45 ° (degrees)

H(jw = 0.2w_c) = 0.1569 at angle 78.69 °

H(jw = 5w_c) = 0.7845 at angle 11.31 °

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) = 282.5 cos(wt + 45 °) mV (milli V)

For ω = 0.2ω_c, v_o(t) = 78.45 cos(wt + 78.69 °) mV (milli V)

For ω = 5ω_c, v_o(t) = 392.25 cos(wt + 11.31 °) mV (milli V)

Correct

Marks for this submission: 20.00/20.00.