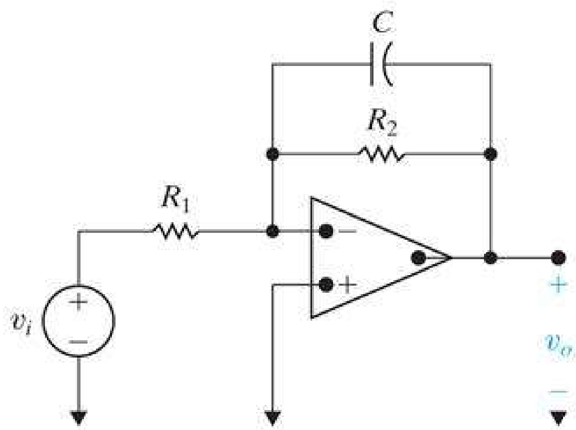
Started on	Monday, 24 April 2017, 3:14 PM
State	Finished
Completed on	Monday, 1 May 2017, 5:15 AM
Time taken	6 days 14 hours
Grade	**27.00** out of 100.00

Question 1

Correct

Mark 13.00 out of 13.00



P15.1_10ed

Given: R_1 = ?? Ω (Ohm) C_{in} = 750 nF (nano F) R_2 = ?? Ω (Ohm)

Assume the opamp is ideal.

Design a low-pass filter with a passband gain of 10 dB and a cutoff frequency of 1 kHz.

R_1 = 67.16 Ω (Ohm)

R_2 = 212.21 Ω (Ohm)

After you get a numeric answer, consider creating a PSpice simulation and compare your answer with the simulation results.

R_1 = 212.2066 Ω

R_2 = 67.1056 Ω

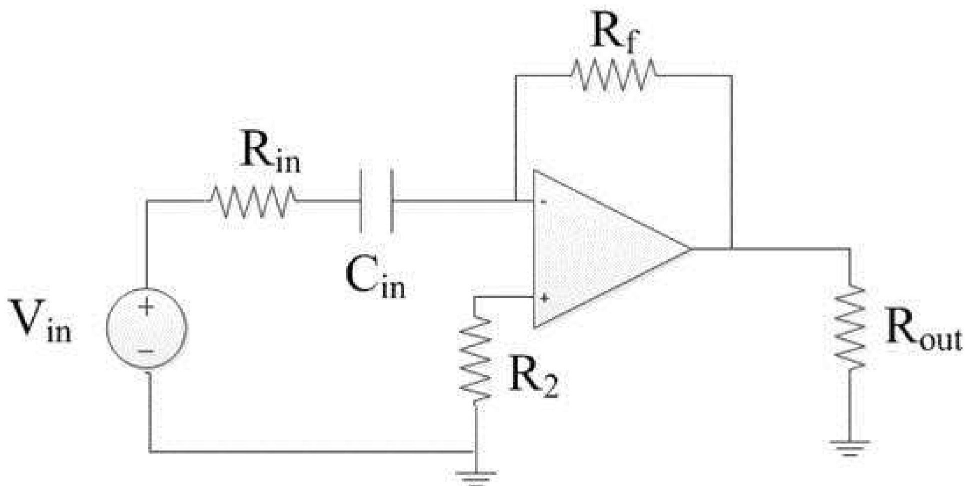
Correct

Marks for this submission: 13.00/13.00.

Question 2

Not answered

Mark 0.00 out of 14.00



P15.1T

Given: R_{in} = 10 kΩ (kilo Ohm) C_{in} = 0.1 μF (micro F) R_2 = 10 Ω (Ohm)

R_{out} = 1 kΩ (kilo Ohm) R_f = 10 kΩ (kilo Ohm)

V_{in} = 20 cos(ωt) Volts

The opamp is not ideal and can only deliver up to 15 mA at the output.

The opamp has power input rails at +15V and -15V.

Determine the radian frequency ω where the opamp just begins saturation.

$\omega_{saturation}$ = ☐ ✗ rad/sec

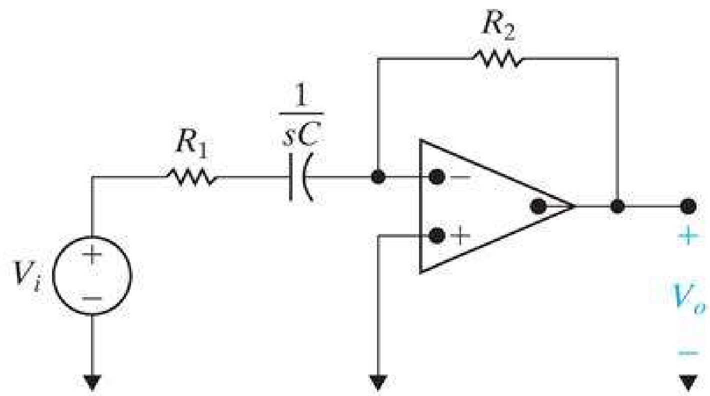
After you get a numeric answer, consider creating a PSpice simulation and compare your answer with the simulation results.

$\omega_{saturation}$ = 1,133.8934 rad/sec

Question 3

Partially correct

Mark 4.67 out of 14.00



P15.11_10ed

Given: R_1 = 159 Ω (Ohm) C_{in} = 250 nF (nano F) R_2 = 1,273 Ω (Ohm)

Assume the opamp is ideal.

The input to this high-pass filter is $v_i(t) = 2.5 \cos(\omega t)$ Volts.

The opamp has power input rails at +20V and -20V.

For the steady-state condition and letting the output voltage magnitude be negative:

a) Find the output voltage when the input frequency $\omega = \omega_c$. (ω = omega)

$v_o(t)$ = [14.15] ✗ cos([8000] ✓ π t + [-135] ✗ °) (Degrees) Volts

b) Find the output voltage when the input frequency $\omega = 0.125\ \omega_c$.

$v_o(t)$ = [2.475] ✗ cos([1000] ✓ π t + [-97.13] ✗ °) (Degrees) Volts

c) Find the output voltage when the input frequency $w = 8\ \omega_c$.

$v_o(t)$ = [19.8] ✗ cos([64000] ✓ π t + [-172.9] ✗ °) (Degrees) Volts

After you get a numeric answer, create a PSpice simulation and compare your answer with the simulation results.

a) $v_o(t) = -14.1533 \cos(8{,}008\pi\, t + 45°)$ V

b) $v_o(t) = -2.4827 \cos(1{,}001\pi\, t + 82.87°)$ V

c) $v_o(t) = -19.8612 \cos(64{,}062.3670\pi\, t + 7.13°)$ V

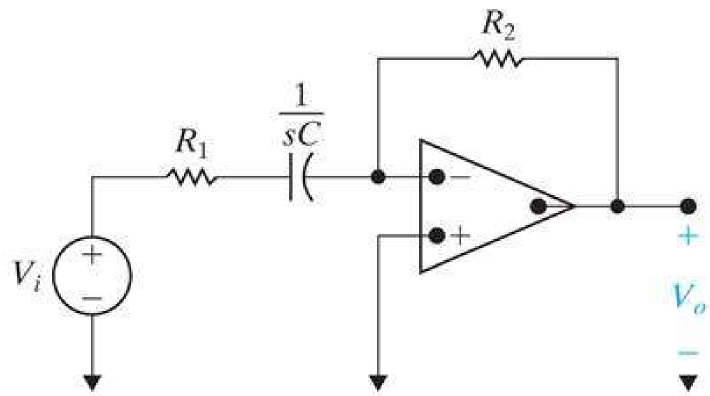
Partially correct

Marks for this submission: 4.67/14.00. Accounting for previous tries, this gives **4.67/14.00.**

Question 4

Correct

Mark 9.33 out of 14.00



P15.8_10ed

Given: R_1 = ?? Ω (Ohm) C_{in} = 3.9 nF (nano F) R_2 = ?? Ω (Ohm)

Assume the opamp is ideal.

Design a high-pass filter with a passband gain of 14 dB and a cutoff frequency of 8 kHz.

R_1 = 5100 Ω (Ohm)

R_2 = 25550 Ω (Ohm)

After you get a numeric answer, consider creating a PSpice simulation and compare your answer with the simulation results.

R_1 = 5,101.120 Ω

R_2 = 25,566.1621 Ω

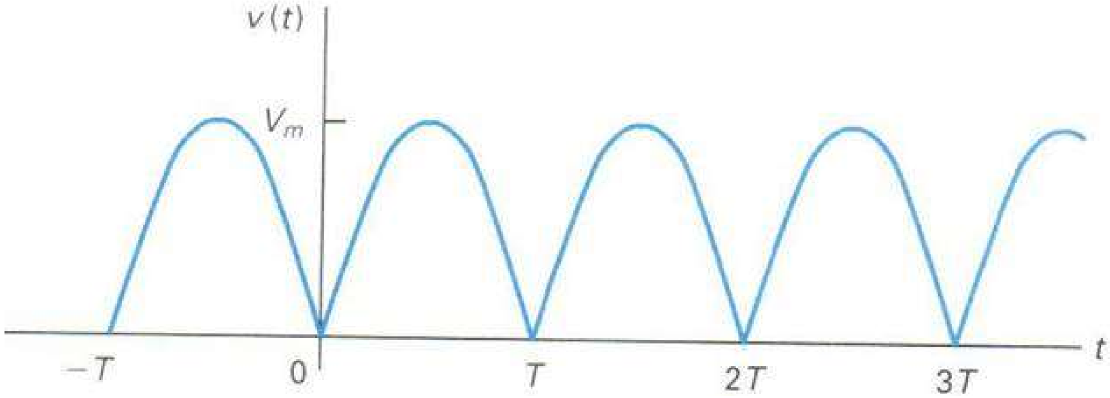
Correct

Marks for this submission: 14.00/14.00. Accounting for previous tries, this gives **9.33/14.00.**

Question **5**

Not answered

Mark 0.00 out of 15.00



P16.03b_6ed

Find the Fourier series coefficients for this periodic waveform which is a full-wave rectified sine wave where $v(t) = V_m \sin(\pi t/T)$ for $0 \le t \le T$.

a) Find a_v.

a_v = [ ] ✗ V_m / π

b) Find a_k.

a_k = [ ] ✗ $V_m / [\pi (1 -$ [ ] ✗ $k^2]$ for all k

c) Find b_k.

b_k = [ ] ✗

a) $a_v = 2\, V_m / \pi$

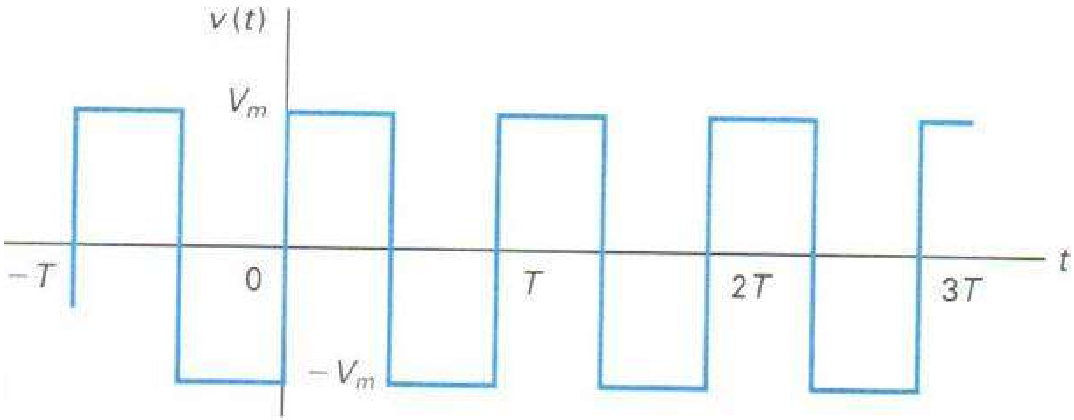
b) $$a_k = \frac{4V_m}{\pi(1-4k^2)}$$

c) $b_k = 0$

Question 6

Not answered

Mark 0.00 out of 15.00



AP16.5_10ed

Find the Fourier series coefficients for this periodic waveform.

a) Find a_v.

a_v =

b) Find a_k.

a_k =

c) Find b_k.

b_k = $V_m / \pi k$ for k

a) $a_v = 0$

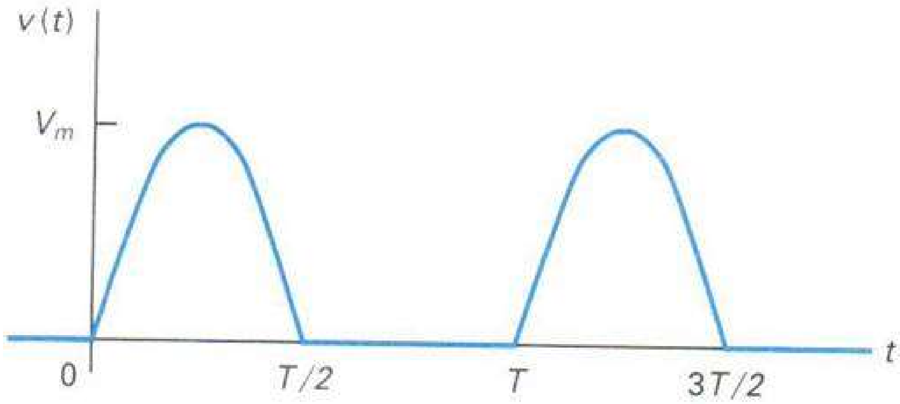
b) $a_k = 0$

c) $b_k = \frac{4V_m}{\pi k}$ for k odd

Question 7

Not answered

Mark 0.00 out of 15.00



P16.03c_6ed

Find the Fourier series coefficients for this periodic waveform which is a half-wave rectified sine wave where $v(t) = V_m \sin(2\pi t/T)$ for $0 \le t \le T/2$.

Also given $V_m = 12$ V.

a) Find a_v.

a_v = [ ] ✗ Volts

b) Find a_k.

a_k = [ ] ✗ $/ (1 - k^2)$ Volts for all even

c) Find b_k.

b_k = [ ] ✗ for k even and for k odd > 1.

b_1 = [ ] ✗ $\sin(\omega_0 t)$ Volts

a) a_v = 3.8197 V

b) $$a_{k,even} = \frac{2V_m}{\pi}\left[\frac{1}{1-k^2}\right] = 7.6394\left[\frac{1}{1-k^2}\right]V$$

c) b_k = 0 for k even and odd (for k > 1)

$b_1 = (12V/2)\sin(\omega_0 t) = 6\sin(\omega_0 t)$ Volts