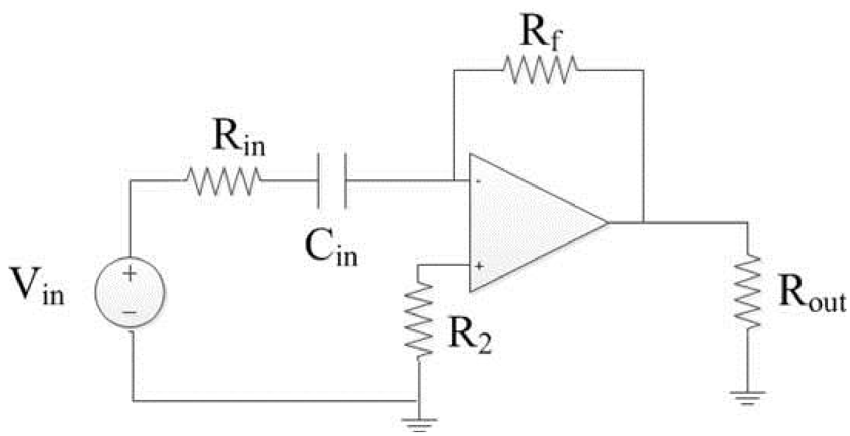
Started on	Sunday, 30 April 2017, 9:16 PM
State	Finished
Completed on	Monday, 1 May 2017, 12:06 AM
Time taken	2 hours 49 mins
Grade	**100.00** out of 100.00

Question 1

Correct

Mark 13.00 out of 13.00



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.

$\omega_{saturation}$ = 1138.9

rad/sec

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

$?_{saturation}$ = 1,133.8934 rad/sec

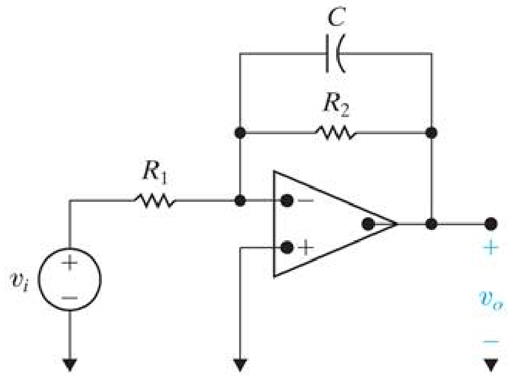
Correct

Marks for this submission: 13.00/13.00.

Question 2

Correct

Mark 14.00 out of 14.00



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

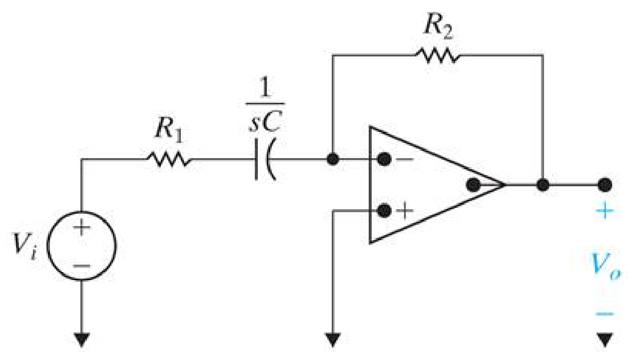
Correct

Marks for this submission: 14.00/14.00.

Question 3

Correct

Mark 14.00 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(ωt) 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 ω = ω_c. (ω = omega)

$v_o(t)$ = -14.15

cos(8000 π t + 45 °) (Degrees) Volts

b) Find the output voltage when the input frequency ω = 0.125 ω_c.

$v_o(t)$ = -2.48

cos(1000 π t + 82.8 °) (Degrees) Volts

c) Find the output voltage when the input frequency w = 8 ω_c.

$v_o(t)$ = -19.8

cos(64000 π t + 7.12 °) (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(8,008π t + 45°) V

b) $v_o(t)$ = -2.4827 cos(1,001π t + 82.87°) V

c) $v_o(t)$ = -19.8612 cos(64,062.3670π t + 7.13°) V

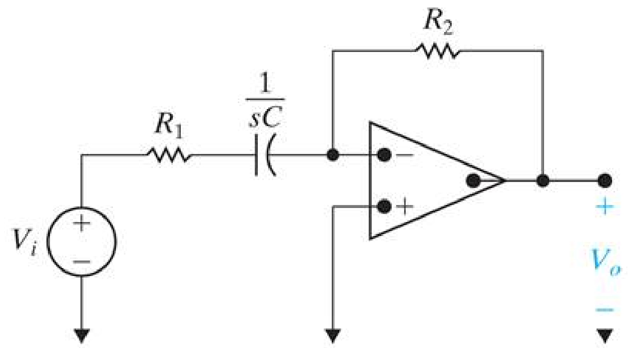
Correct

Marks for this submission: 14.00/14.00.

Question 4

Correct

Mark 14.00 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

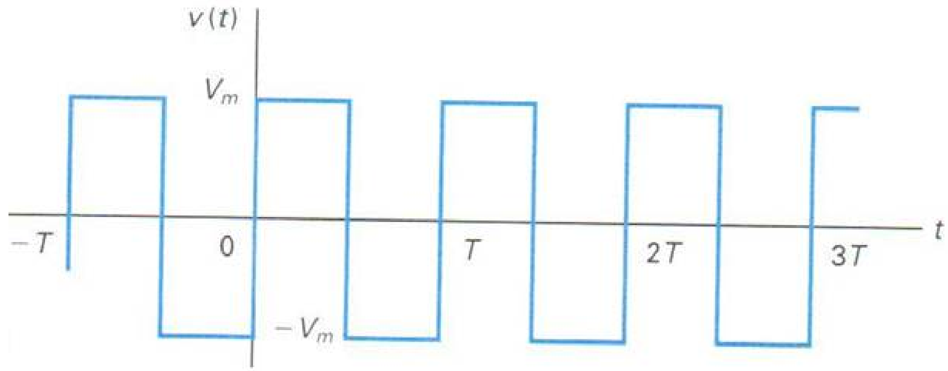
Correct

Marks for this submission: 14.00/14.00.

Question 5

Correct

Mark 15.00 out of 15.00



AP16.5_10ed

Find the Fourier series coefficients for this periodic waveform.

a) Find a_v.

a_v = 0

b) Find a_k.

a_k = 0

c) Find b_k.

b_k = 4

V_m / πk for k Odd

a) $a_v = 0$

b) $a_k = 0$

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

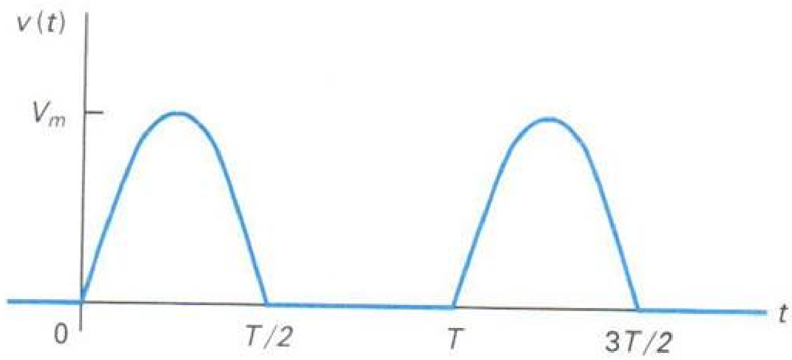
Correct

Marks for this submission: 15.00/15.00.

Question 6

Correct

Mark 15.00 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 = 3.8

Volts

b) Find a_k.

a_k = 7.64

/ (1 - k^2) Volts for all even

c) Find b_k.

b_k = 0

for k even and for k odd > 1.

b_1 = 6

$\sin(\omega_0 t)$ Volts

a) a_v = 3.8197 V

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

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

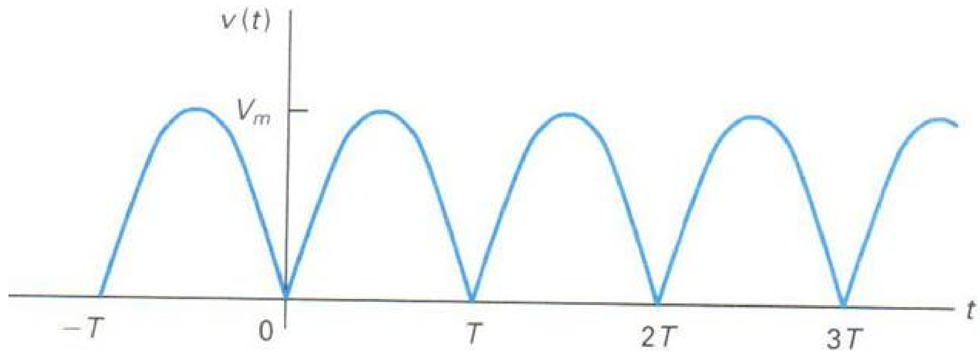
Correct

Marks for this submission: 15.00/15.00.

Question 7

Correct

Mark 15.00 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 = 2 ✓

V_m / π

b) Find a_k.

a_k = 4 ✓

V_m / [π (1 - 4 ✓ k^2] for all k

c) Find b_k.

b_k = 0 ✓

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

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

c) $b_k = 0$

Correct

Marks for this submission: 15.00/15.00.