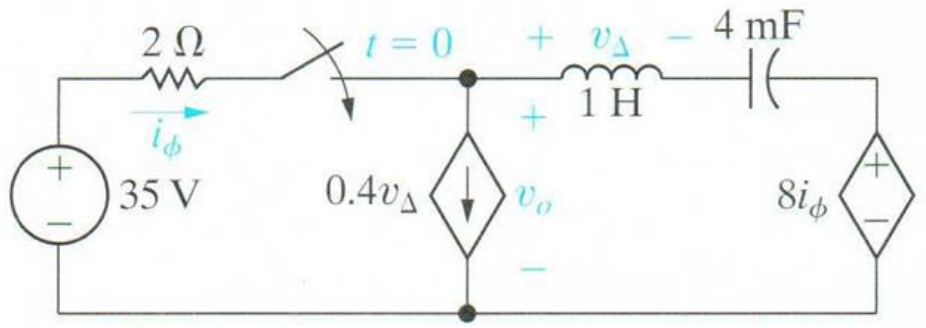
Home ► My courses ► EEE117-2017S-Tatro ► Homework ► Homework 9 - Chapter 13

Started on	Sunday, 2 April 2017, 7:55 PM
State	Finished
Completed on	Sunday, 2 April 2017, 11:11 PM
Time taken	3 hours 15 mins
Grade	**90.57** out of 100.00

Question 1

Partially correct

Mark 7.00 out of 10.00



P13.13_6ed and P13.15_7ed

Given: No energy is stored in this circuit for t < 0.

At time t = 0, the switch closes (i.e. makes contact).

a) For t > 0, Redraw this circuit in the frequency domain and find the Laplace form of the voltage $v_0(t)$.

V(s) = 35 ✓

/s + (mag 11111 ✗ Angle 167.91 ✓ °)/(s + 1 – j 7)

+ (mag 11111 ✗

Angle 11111 ✗ °)/(s + 1 + j 7)

b) Find the inverse transform to find the time domain $v_0(t)$.

$v_0(t)$ = [35 ✓

+ 5.73 ✓ exp(-1 ✓ t) cos (7 ✓ t + 168 ✓ °] u(t) V

$$V_0 = \frac{35}{s} + \frac{2.864 \angle 167.91^\circ}{s+1-j7} + \frac{2.864 \angle [?][?] -167.91^\circ}{s+1+j7}$$

$$v_0(t) = \left[35 + 5.727 e^{-t} \cos\left(7t + 167.91^\circ\right)\right] u(t) Volts$$

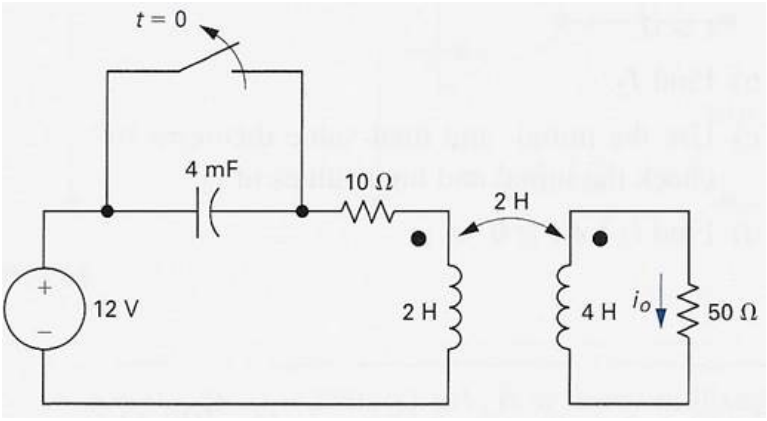
Partially correct

Marks for this submission: 7.00/10.00.

Question 2

Partially correct

Mark 5.00 out of 10.00



P13.37_6ed

The switch in this circuit has been closed for a long time before opening at t = 0.

For $t \geq 0$, Find the Laplace form of the voltage $i_0(t)$.

$i_0(t)$ = [11111 ✗

exp(-25 ✓ t) + [11111 ✗ exp(-5 ✓ t) cos(10 ✓ t + 111111 ✗ °)] u(t) mA (milli A)

$$i_0(t) = \left| -300e^{-25t} + 300\sqrt{5}e^{-5t}\cos(10t + 63.43^\circ) \right| u(t) mAmps$$

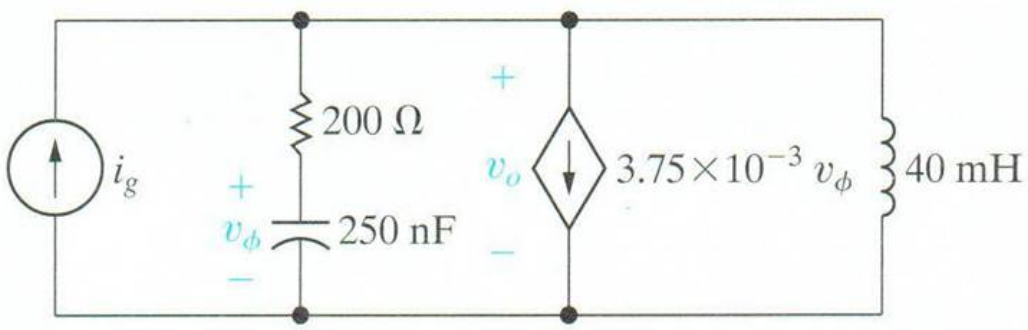
Partially correct

Marks for this submission: 5.00/10.00.

Question 3

Correct

Mark 10.00 out of 10.00



P13.17_7ed

Given: No energy is stored in this circuit for $t < 0$ and $i_g = 5$ mA for $t \geq 0$.

a) For $t > 0$, Redraw this circuit in the frequency domain and find the Laplace form of the voltage $v_0(t)$.

V(s) = (s + 20000) / (s + 10000)^2

b) Find the inverse transform to find the time domain $v_0(t)$.

$v_0(t)$ = [10000 t exp(-10000 t) + exp(-10000 t)] u(t) V

$$V_0(s) = \frac{s+20{,}000}{(s+10{,}000)^2}$$

$$v_0(t) = \left[10{,}000te^{-10{,}000t} + e^{-10{,}000t}\right]u(t)Volts$$

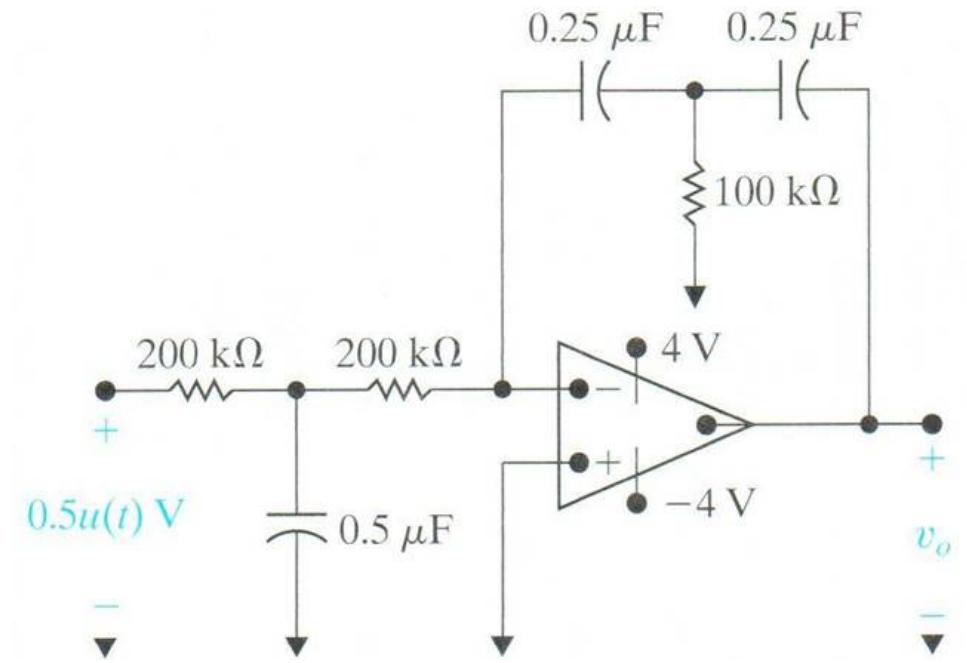
Correct

Marks for this submission: 10.00/10.00.

Question 4

Correct

Mark 10.00 out of 10.00



P13.48_7ed

Given: No energy is stored in this circuit for t < 0 and you can assume the OpAmp is ideal.

a) For t > 0, Redraw this circuit in the frequency domain and find the Laplace form of the voltage $v_0(t)$.

$V_0(s)$ = -200 ✓

/ s^3

b) Find the inverse transform to find the time domain $v_0(t)$.

$v_0(t)$ = -100 ✓

t 2 ✓ u(t) V

c) Calculate how long in ms (milli sec) until the opamp saturates.

$t_{saturation}$ = 200 ✓

ms (milli sec)

$$V_0 = \frac{-200}{s^3}$$

$$v_0(t) = [?][?] - 100t^2u(t) Volts$$

c) $t_{saturation}$ = 200 ms (milli sec)

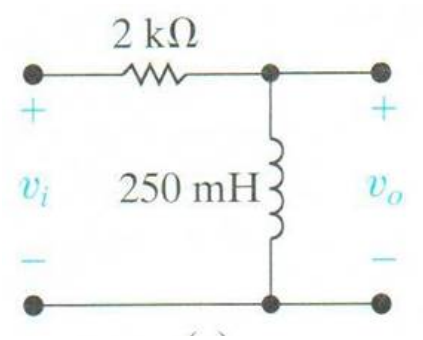
Correct

Marks for this submission: 10.00/10.00.

Question 5

Correct

Mark 10.00 out of 10.00



P13.49c_7ed

Find the s domain transfer function H(s) = V_0/V_i for this circuit.

H(s) = s / (s + 8000 ✓

)

$$H(s) = \frac{s}{s+8{,}000}$$

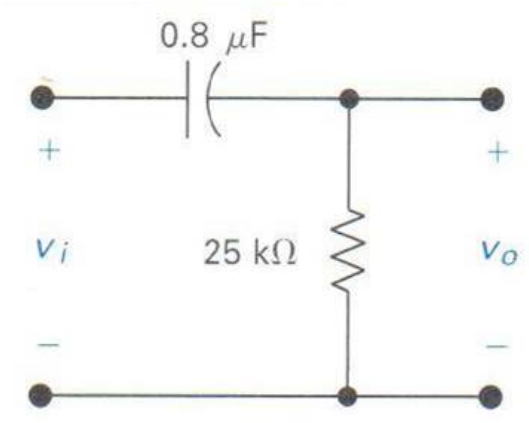
Correct

Marks for this submission: 10.00/10.00.

Question 6

Correct

Mark 10.00 out of 10.00



P13.49b_6ed

Find the s domain transfer function H(s) = V_0/V_i for this circuit.

H(s) = s / (s + 50 ✓

)

$$H(s) = \frac{s}{s+50}$$

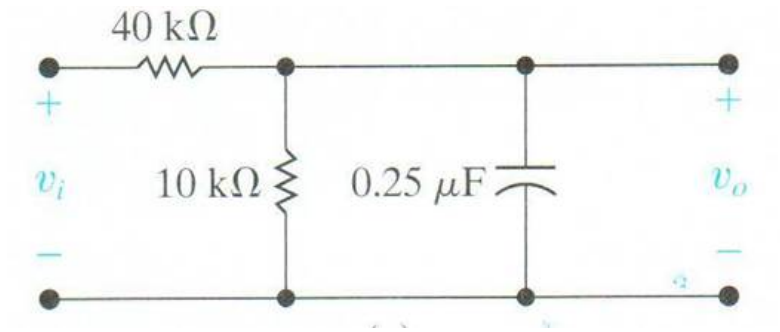
Correct

Marks for this submission: 10.00/10.00.

Question 7

Correct

Mark 10.00 out of 10.00



P13.49e_7ed

Find the s domain transfer function H(s) = V_0/V_i for this circuit.

H(s) = 100 ✓

/ (s + 500 ✓)

$$H(s)=\frac{100}{s+500}$$

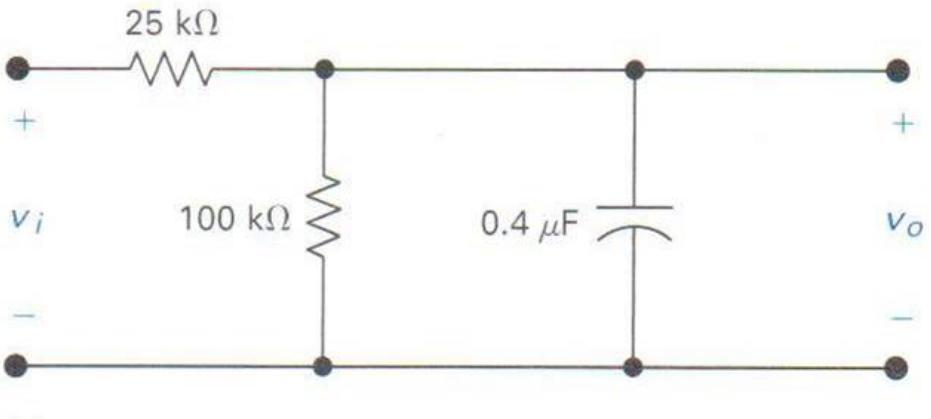
Correct

Marks for this submission: 10.00/10.00.

Question 8

Correct

Mark 10.00 out of 10.00



P13.49e_6ed

Find the s domain transfer function H(s) = V_0/V_i for this circuit.

H(s) = 100 ✓

/ (s + 125 ✓)

$$H(s)=\frac{100}{s+125}$$

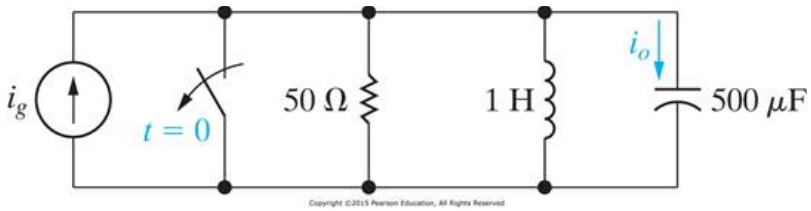
Correct

Marks for this submission: 10.00/10.00.

Question 9

Partially correct

Mark 8.57 out of 10.00



P13.56_10ed

There is no energy stored in this circuit at the time the switch is opened. The sinusoidal current source is generating the signal 25 cos (200 t) mA (milli Amp). The desired response signal is the current $i_0(t)$.

a) Find the s domain transfer function $H(s) = I_0/I_g$ for this circuit.

$H(s) = s^2 / (s^2 +$ 40 ✓

s + 2000 ✓)

b) Find the s domain form for $I_0(s)$.

$I_0(s) =$ .025 ✓

s^3 / (There are four factors in the denominator – list each one separately)

Factor 1: s + 20 – j 40 ✓

Factor 2: s + 20 + j 40 ✓

Factor 3: s + 0 - j 200 ✓

Factor 4: s + 0 + j 200 ✓

c) Find the time domain form $i_0(t)$.

$i_0(t) =$ [111111 ✗

exp(-20 ✓ t) cos(40 ✓ t + -97.94 ✓ °) + 111111 ✗ cos(200 ✓ t + 11.89 ✓ °)] u(t) mA (milli A)

$$H(s) = \frac{I_0}{I_g} = \frac{s^2}{s^2+40s+2{,}000}$$

$$I_0 = \frac{0.025s^3}{(s+20-j40)(s+20+j40)(s+0-j200)(s+0+j200)}$$

$$i_0(t) = \left[1.4395e^{-20t}\cos(40t-97.94^\circ)+25.7514\cos(200t+11.89^\circ)\right]u(t)mA$$

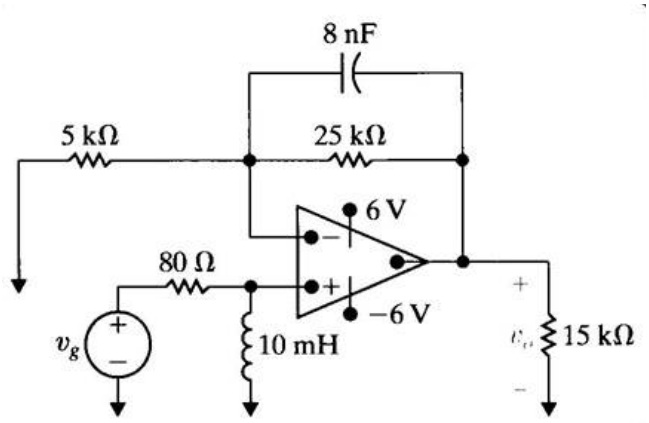
Partially correct

Marks for this submission: 8.57/10.00. Accounting for previous tries, this gives **8.57/10.00**.

Question 10

Correct

Mark 10.00 out of 10.00



P13.78_7ed and P13.77_10ed

You may assume the opamp is ideal.

a) Find the s domain transfer function $H(s) = V_0/V_g$ for this circuit.

H(s) = s * (s + 30000 ✓

/ [(s + 5,000) * (s + 8000 ✓)]

b) Find the time domain $v_0(t)$ if $v_g(t) = 600\ u(t)$ mV (milli V).

$v_0(t)$ = [5 ✓

$e^{-5,000t}$ + -4.4 ✓ exp(-8000 ✓ t)] u(t) V

c) Find the steady-state express for $v_0(t)$ if $v_g(t) = 2 \cos(10{,}000\ t)$ V.

$v_0(t)_{steady\text{-}state}$ = [4.42 ✓

cos (10000 ✓ + -6.34 ✓ °] u(t) V

$$H(s) = \frac{s(s+30{,}000)}{(s+5{,}000)(s+8{,}000)}$$

$$v_0(t) = \left[5e^{-5{,}000t} - 4.4e^{-8{,}000t}\right]u(t)\,Volts$$

$$v_0(t)_{steady-state} = 4.4172\cos(10{,}000t - 6.34^\circ)u(t)\,Volts$$

Correct

Marks for this submission: 10.00/10.00.