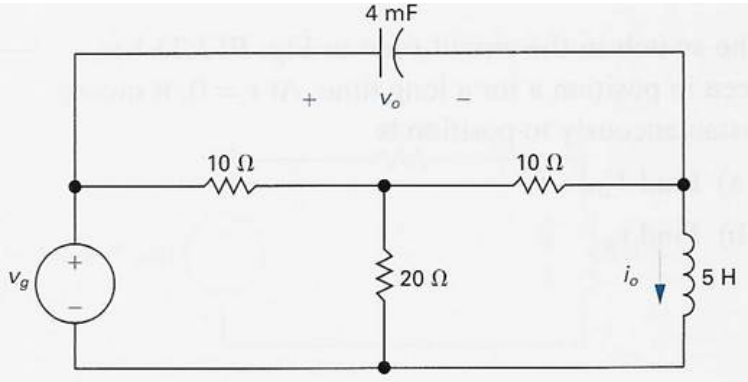
Started on	Sunday, 2 April 2017, 5:07 PM
State	Finished
Completed on	Sunday, 2 April 2017, 5:07 PM
Time taken	8 secs
Grade	**90.92** out of 100.00

Question 1

Partially correct

Mark 2.50 out of 10.00



P13.27b_6ed

There is no energy stored in this circuit for t < 0.

Given that $v_g(t) = 75\ u(t)$ for $t \geq 0$.

a) For t > 0, Redraw this circuit in the frequency domain and find the Laplace form of the current $i_0(t)$.

$I_0(s) =$ [-2.3] ✗ / [s (s + [-0.8503] ✗)]

b) Find the time domain $i_0(t)$.

$i_0(t) =$ [2.99] ✓ [1 - exp([0.8503] ✗ t)] u(t) A

$$I_0 = \frac{15}{s(s+5)}$$

$$i_0(t) = 3\left[1 - e^{-5t}\right]u(t)\,Amps$$

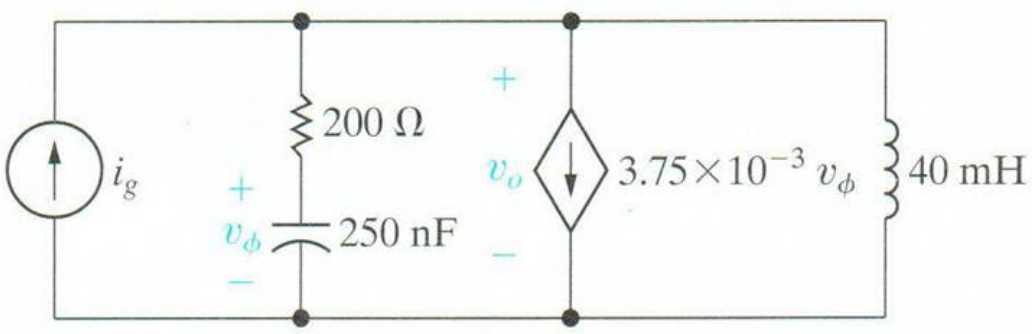
Partially correct

Marks for this submission: 2.50/10.00.

Question 2

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 ≥ 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

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

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

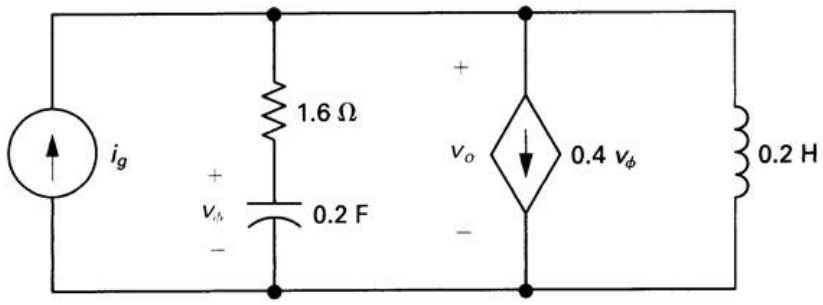
Correct

Marks for this submission: 10.00/10.00.

Question 3

Correct

Mark 10.00 out of 10.00



P13.11_6ed

There is no energy stored in the circuit at t = 0.

Find $v_0(t)$ if $i_g(t)$ = 15 u(t) A.

$v_0(t)$ = [-45 ✓ t exp(-5 ✓ t) + 24 ✓ exp(-5 ✓ t)] u(t) V

$$v_0(t)=\left[-45te^{-5t}+24e^{-5t}\right]u(t)V$$

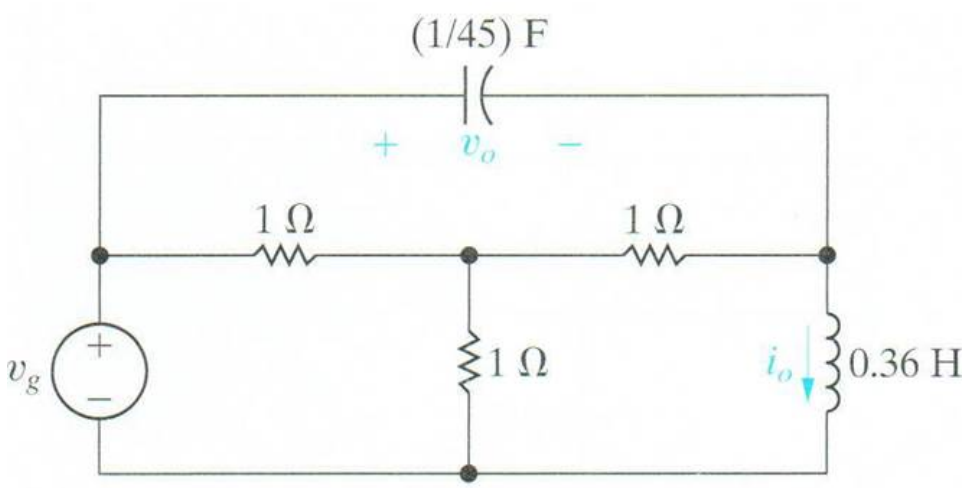
Correct

Marks for this submission: 10.00/10.00.

Question 4

Partially correct

Mark 8.42 out of 10.00



P13.28_7ed

Given: No energy is stored in this circuit for t < 0 and $v_g(t)$ = 54 V for t ≥ 0.

a) For t > 0, Redraw this circuit in the frequency domain and find the Laplace form of the voltage $v_0(t)$ and $i_0(t)$.

$V_0(s)$ = 449.982 ✗ (54 ✗ s + -5 ✗ / (s (s+ 5 ✓) (s+ 25 ✓))

$I_0(s)$ = 150 ✓ (s + 15 ✓ / (s (s+ 5 ✓)(s+ 25 ✓))

b) Find the inverse transform to find the time domain $v_0(t)$ and $i_0(t)$.

$v_0(t)$ = [54 ✓ + -27 ✓ exp(-5 ✓ t) + -27 ✓ exp(-25 ✓ t)] u(t) V

$i_0(t)$ = [18 ✓ + -15 ✓ exp(-5 ✓ t) + -3 ✓ exp(-25 ✓ t)] u(t) A

$$V_0 = \frac{270(3s+25)}{s(s+5)(s+25)} \quad I_0 = \frac{150(s+15)}{s(s+5)(s+25)}$$

$$v_0(t) = \left[54 - 27e^{-5t} - 27e^{-25t}\right)\Big]u(t)V$$
$$i_0(t) = \left[18 - 15e^{-5t} - 3e^{-25t}\right)\Big]u(t)Amps$$

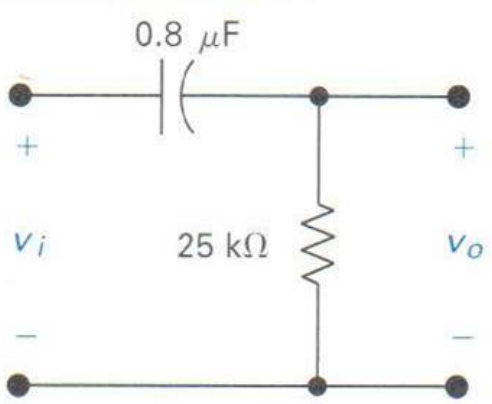
Partially correct

Marks for this submission: 8.42/10.00. Accounting for previous tries, this gives **8.42/10.00**.

Question 5

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 ✓)

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

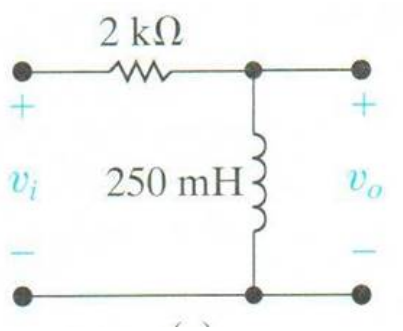
Correct

Marks for this submission: 10.00/10.00.

Question 6

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 ✓)

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

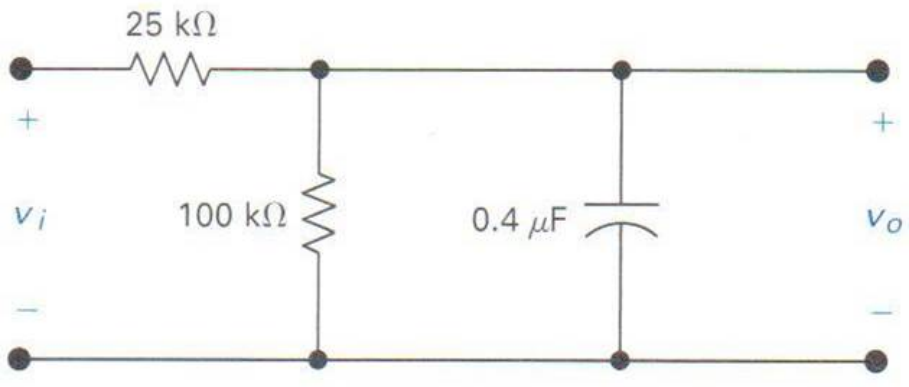
Correct

Marks for this submission: 10.00/10.00.

Question 7

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 ✓)

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

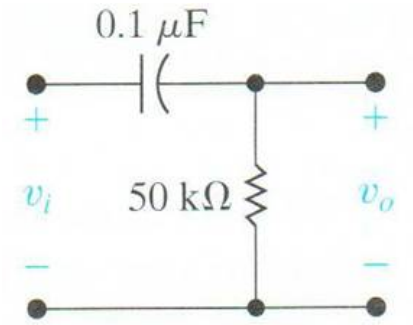
Correct

Marks for this submission: 10.00/10.00.

Question 8

Correct

Mark 10.00 out of 10.00



P13.49b_7ed

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

H(s) = s / (s + 200 ✓)

$$H(s)=\frac{s}{s+200}$$

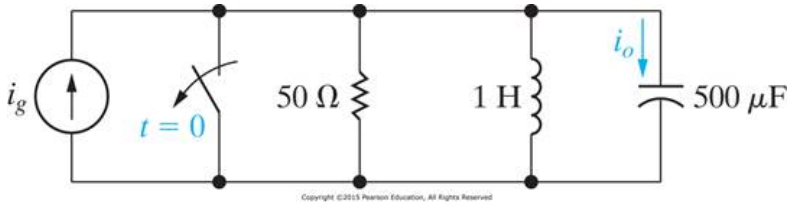
Correct

Marks for this submission: 10.00/10.00.

Question 9

Correct

Mark 10.00 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 $I_0(s)$.

$I_0(s) =$ 0.025 ✓ 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 $i_0(t)$.

$i_0(t) = [$ 1.44 ✓ exp(-20 ✓ t) cos(40 ✓ t + -97.94 ✓ °) + 25.76 ✓ cos(200 ✓ t + 11.98 ✓ °)] u(t) mA (milli A)

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

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

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

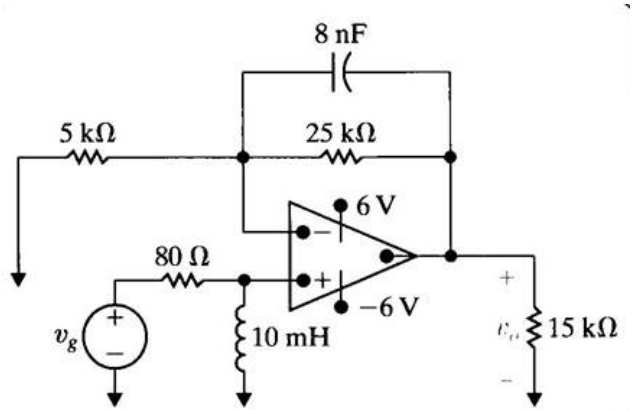
Correct

Marks for this submission: 10.00/10.00.

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.