Started on	Wednesday, 23 January 2019, 10:08 AM
State	Finished
Completed on	Saturday, 26 January 2019, 8:17 AM
Time taken	2 days 22 hours
Grade	**98.57** out of 100.00

Question 1

Correct

Mark 10.00 out of 10.00

T9.04

Given v(t) = 100 sin(500 t - 23°) Volts

Translate the voltage into the cosine form.

v(t) = 100 ✓ cos(500 ✓ t + -113 ✓ °) Volts

b) Find the rms value of the voltage.

V_{rms} = 70.7 ✓ Vrms

c) Find the voltage v(t) at t = 5 ms (milli sec).

v(t = 5 ms) = 86.3 ✓ V

Correct

Marks for this submission: 10.00/10.00.

Question 2

Correct

Mark 10.00 out of 10.00

Ex9.01_9ed

A sinusoidal current has maximum amplitude of I_{peak} = 90 A.

The current passes through one complete cycle in T = 11.50 ms (milli sec).

a) What is the rms value of the current?

I_{rms} = 63.6 ✓ A_{rms}

b) What is the frequency in hertz?

f = 87 ✓ Hz

c) What is the frequency in radians per second?

ω = 546 ✓ rad/sec

Correct

Marks for this submission: 10.00/10.00.

Question 3

Correct

Mark 10.00 out of 10.00

P9.02_9ed

At t = -2 ms (milli sec), a sinusoidal voltage is known to be zero and going positive.

[Hint: The easiest representation of the waveform at t = -2 ms is the sine and not the cosine form.]

The voltage is next zero at t = 8 ms (millisec).

It is also known that the voltage is 80.9V at t = 0.

a) What is the frequency of v(t) in hertz?

f = 50 ✓ Hz

b) What are the following parameters of the voltage v(t)in the cosine form expression?

The frequency of the voltage source?

ω (omega) = 314 ✓ radians/sec

The phase angle f_v (phi_v)?

φ_v (phi_v) = -54 ✓ ° (Degrees)

The maximum voltage V_m?

V_m = 138 ✓ V

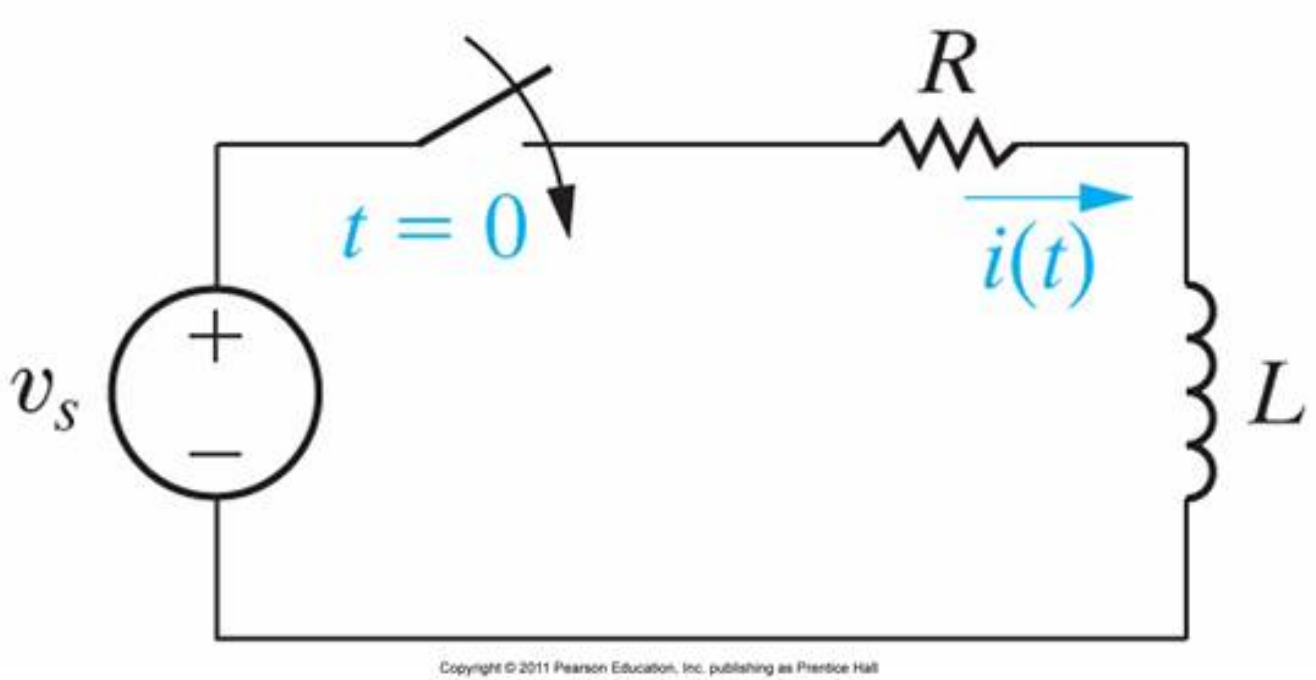
Correct

Marks for this submission: 10.00/10.00.

Question 4

Correct

Mark 10.00 out of 10.00



P9.09_10ed

The voltage applied to this circuit at t = 0 (when the switch closes) is $v_s(t)$ = 75 cos (4,000 t - 60°) Volts

Also given that R = 400 Ω (0hm) and L = 75 mH (milli Henry)

The initial inductor current is zero for $t < 0^-$.

The text gives you the response equation as:

$$i(t)=i_{transient}(t)+i_{steady\_state}(t)=\frac{-V_m}{\sqrt{R^2+(\omega L)^2}}\cos(\phi-\theta)e^{-(\frac{R}{L})t}+\frac{V_m}{\sqrt{R^2+(\omega L)^2}}\cos(\omega t+\phi-\theta)$$

Where $\theta = \tan^{-1}\left(\frac{\omega L}{R}\right)$ and $v(t) = V_m \cos(\omega t + \varphi)$

For t = 750 µsec (micro sec) after the switch closed, find the following values.

a) Find the numerical value of the transient response of i.

$i_{transient}$ = .33 ✓ mA (milli Amp)

b) Find the numerical value of the steady state response of i.

i_{steady_state} = 39 ✓ mA (milli Amp)

c) Find the total response i.

i_{total} = 39 ✓ mA (milli Amp)

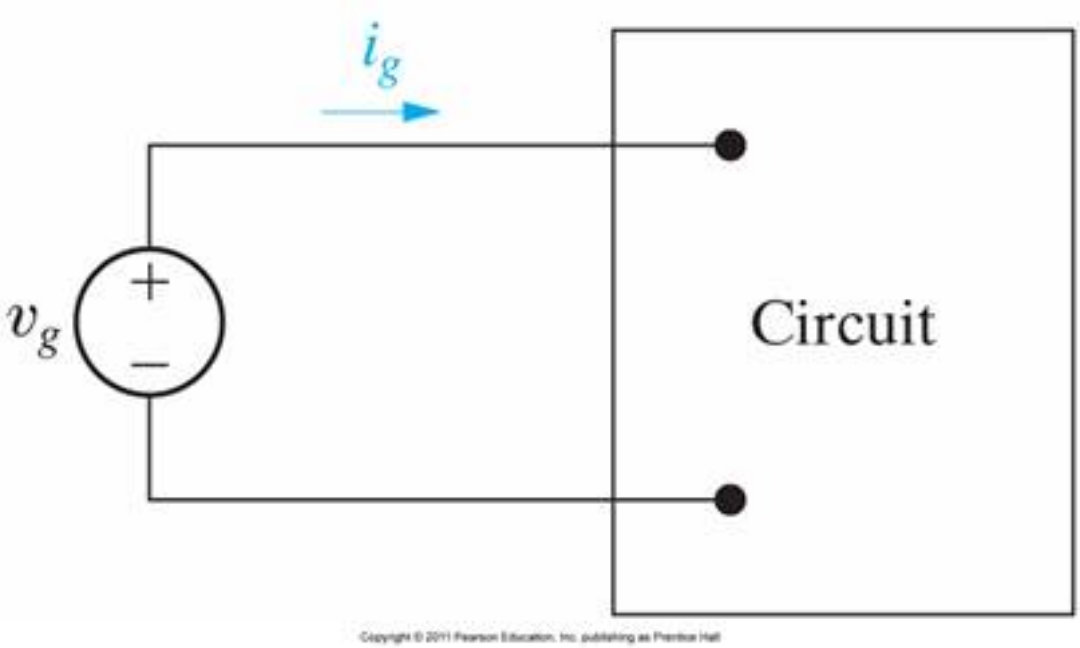
Correct

Marks for this submission: 10.00/10.00.

Question 5

Correct

Mark 10.00 out of 10.00



P9.12_9ed

The expressions for the steady-state voltage and current at the terminals of the circuit are

$v_g = 300 \cos(5{,}000\,\pi\,t + 78°)$ V

$i_g = 6 \sin(5{,}000\,\pi\,t + 123°)$ A

a) What is the impedance seen by the source? Write in rectangular form.

Z = 35 ✓ + j 35 ✓ Ω (Ohm)

b) By how much time t in microseconds is the current out of phase with the voltage?

i_g lags v_g by 50 ✓ μs (micro sec)

Correct

Marks for this submission: 10.00/10.00.

Question 6

Correct

Mark 10.00 out of 10.00

P9.06_6ed

Use the concept of the phasor to combine the following sinusoidal functions into a single trigonometric express.

The time domain form is assumed to be similar to $x(t) = \cos(\omega t + \theta°)$

a) $x(t) = 100 \cos(300 t + 45°) + 500 \cos(300 t - 60°)$

$x(t) =$ 483 ✓ $\cos(300t +$ -49 ✓ °)

b) $y(t) = 250 \cos(377 t + 30°) - 150 \sin(377 t + 140°)$

$y(t) =$ 121 ✓ $\cos(377 t +$ 4.8 ✓ °)

c) $v(t) = 60 \cos(100 t + 60°) - 120 \sin(100 t - 125°) + 100 \cos(100 t + 90°)$

$v(t) =$ 153 ✓ $\cos(100 t +$ 33 ✓ °)

d) $w(t) = 100 \cos(\omega t + 40°) + 100 \cos(\omega t + 160°) + 100 \cos(\omega t - 80°)$

$w(t) =$ 0 ✓ $\cos(w t +$ 0 ✓ °)

Correct

Marks for this submission: 10.00/10.00.

Question 7

Correct

Mark 10.00 out of 10.00

AP9.01_9ed

Find the phasor (based on cosine) transform of each trigonometric function:

a) v = 170 cos (377 t - 40°) Volts

V_{phasor} Magnitude = 170 ✓ V

Angle = -40 ✓ ° (Degree)

b) i = 10 sin (1,000 t + 20°) Amps

I_{phasor} Magnitude = 10 ✓ A

Angle = -70 ✓ ° (Degree)

c) i = 5 cos (ω t + 36.87°) + 10 cos (ω t – 53.13°) Amps

I_{phasor} Magnitude = 11.18 ✓ A

Angle = -27 ✓ ° (Degree)

d) v = 300 cos (20,000 π t + 45°) – 100 sin (20,000 π t + 30°) mV

V_{phasor} Magnitude = 340 ✓ mV

Angle = 62 ✓ ° (Degree)

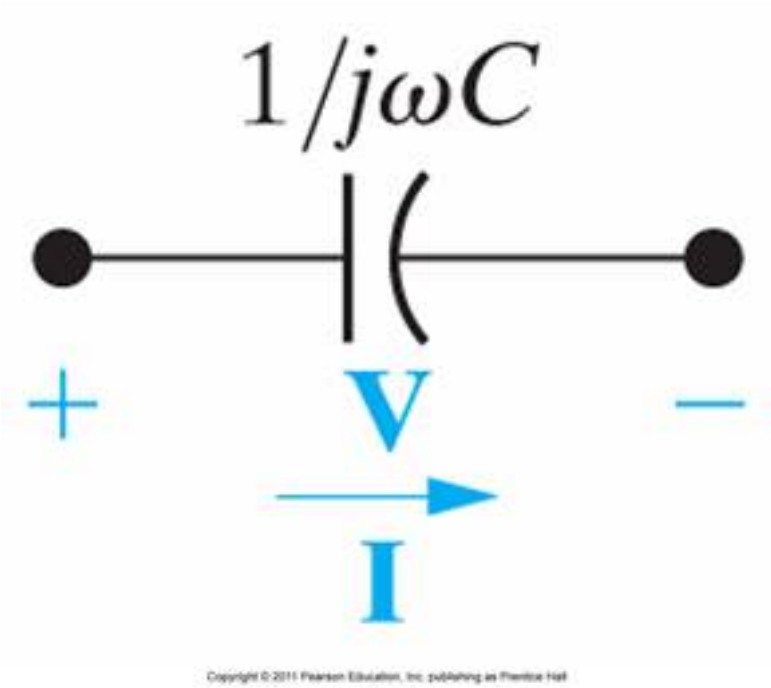
Correct

Marks for this submission: 10.00/10.00.

Question 8

Correct

Mark 8.57 out of 10.00



AP9.04_9ed

The voltage across the terminals of the 5 μF capacitor is 30 cos (4,000 t + 25°) V.

a) Calculate the capacitive reactance.

X_C = -50 ✓ Ω (Ohm)

b) Calculate the impedance of the capacitor.

Z_C = j -50 ✓ Ω (Ohm)

c) Calculate the phasor current **I**.

I = Magnitude .6 ✓ with Angle 115 ✓ ° Amps

d) Write the steady-state expression for i(t).

i(t) = .6 ✓ cos (4000 ✓ t + 115 ✓ °) Amps

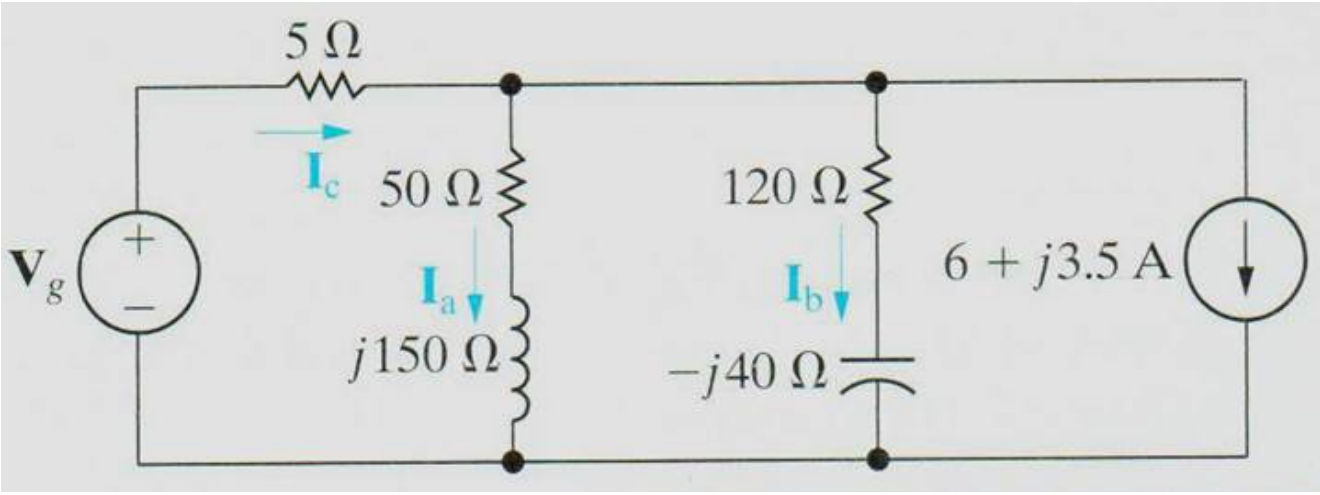
Correct

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

Question 9

Correct

Mark 10.00 out of 10.00



P9.40_7ed

Given the phasor current $\mathbf{I}_a = 2 \angle 0°$ A (magnitude 2 with angle 0 degrees Amps).

Find the following phasor values:

$\mathbf{I}_b$ = Magnitude 2.5 ✓ at Angle 90 ✓ Degrees Amps

$\mathbf{I}_c$ = Magnitude 10 ✓ at Angle 37 ✓ Degrees Amps

$\mathbf{V}_g$ = Magnitude 359 ✓ at Angle 67 ✓ Degrees Volts

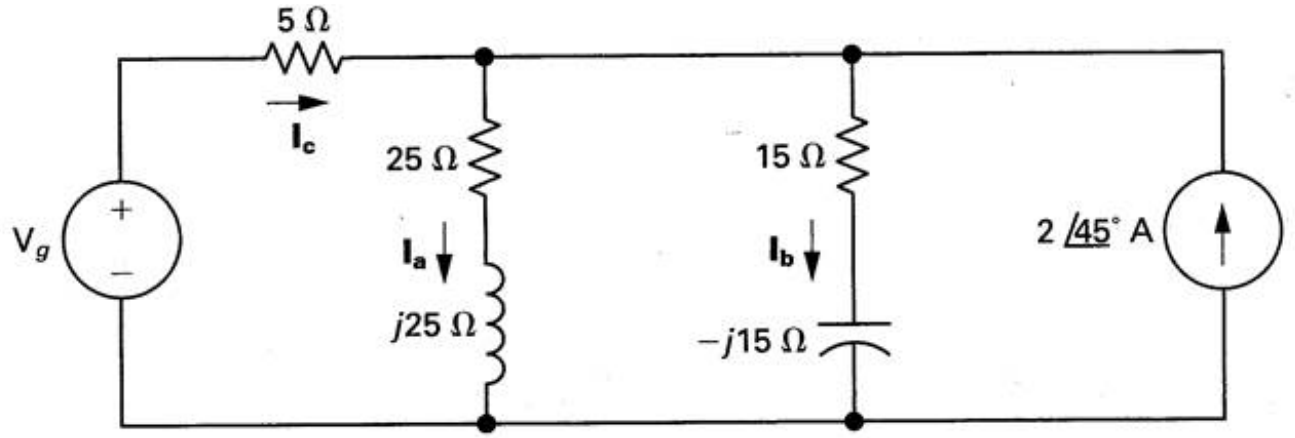
Correct

Marks for this submission: 10.00/10.00.

Question 10

Correct

Mark 10.00 out of 10.00



P9.33_6ed

Given the phasor current $\mathbf{I_b}$ = 5 ∠45° A (magnitude 5 with angle 45 degrees Amps).

Find the following phasor values:

$\mathbf{I_a}$ = Magnitude 3 ✓ at Angle -45 ✓ Degrees Amps

$\mathbf{I_c}$ = Magnitude 4.2 ✓ at Angle 0 ✓ Degrees Amps

$\mathbf{V_g}$ = Magnitude 128 ✓ at Angle 0 ✓ Degrees Volts

Correct

Marks for this submission: 10.00/10.00.

◄ Section 16.7 - rms value of a Fourier Series

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Homework 2 - Chapter 9 ►