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| **Started on** | Wednesday, 25 January 2017, 9:59 AM |
| **State** | Finished |
| **Completed on** | Thursday, 26 January 2017, 9:38 PM |
| **Time taken** | 1 day 11 hours |
| **Grade** | **100.00** out of 100.00 |

**Question 1**

Correct

Mark 10.00 out of 10.00

P9.03_6ed

Consider the sinusoidal voltage v(t) = 170 cos(120 π t - 60°) V. v(t) without symbols is (170 cos( 120 pi t – 60 degrees)

a) What is the maximum amplitude of the voltage? $V_m$ = 170 ✓ V

b) What is the frequency of v(t) in hertz? f = 60 ✓ Hz

c) What is the frequency of v(t) in radians per second? ω (omega) = 376.99 ✓ rad/sec

d) What is the phase angle in radians? φ (phi) = -1.05 ✓ radians

e) What is the phase angle in degrees? φ (phi) = -60 ✓ Degrees

f) What is the period in milliseconds? T = 16.67 ✓ ms (milli sec)

g) What is the first time after t = 0 that v(t) = 170 V? t = 2.78 ✓ ms (milli sec)

**Correct**
Marks for this submission: 10.00/10.00.

**Question 2**

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.

$V_{rms}$ = 70.71 ✓ Vrms

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

v(t = 5 ms) = 86.32 ✓ V

**Correct**
Marks for this submission: 10.00/10.00.

**Question 3**

Correct

Mark 10.00 out of 10.00

T9.03

Given v(t) = 53 cos(1,000 t + 73°) Volts

a) Find the frequency in hertz for this voltage.

f = 159.36 ✓ Hz

a) Find the rms value of the voltage.

$V_{rms}$ = 37.48 ✓ Vrms

c) Find the voltage v(t) at t = 2 ms (milli sec).

v(t = 2 ms) = -52.56 ✓ V

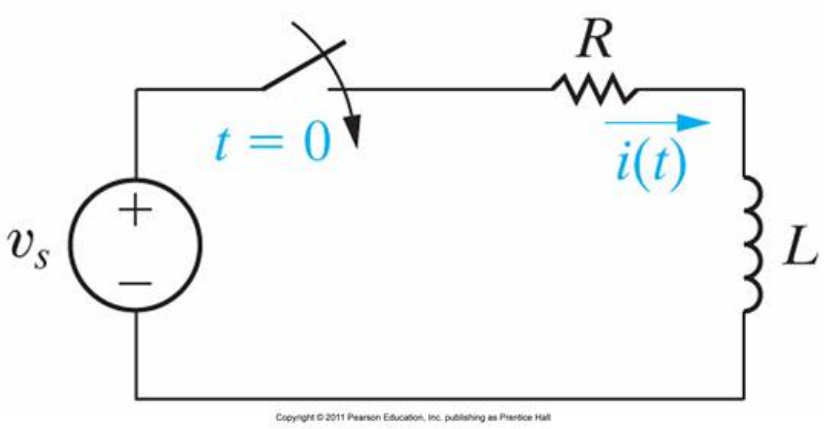
**Correct**

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(ωt + φ)

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.

$i_{transient}$ = 0.329 ✓ mA (milli Amp)

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

$i_{steady\_state}$ = 38.75 ✓ mA (milli Amp)

c) Find the total response i.

$i_{total}$ = 38.75 ✓ mA (milli Amp)

**Correct**

Marks for this submission: 10.00/10.00.

**Question 5**

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

$x(t) =$ 483.857 ✓ $\cos(300t +$ -48.48 ✓ °)

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

$y(t) =$ 120.511 ✓ $\cos(377 t +$ 4.804 ✓ °)

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

$v(t) =$ 152.877 ✓ $\cos(100 t +$ 32.94 ✓ °)

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 6**

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 ✓ V

Angle = -70 ✓ ° (Degree)

c) $i = 5 \cos(\omega t + 36.87°) + 10 \cos(\omega t - 53.13°)$ Amps

$I_{phasor}$ Magnitude = 11.18 ✓ V

Angle = -26.57 ✓ ° (Degree)

d) $v = 300 \cos(20{,}000 \pi t + 45°) - 100 \sin(20{,}000 \pi t + 30°)$ mV

$V_{phasor}$ Magnitude = 339.90 ✓ mV

Angle = 61.51 ✓ ° (Degree)

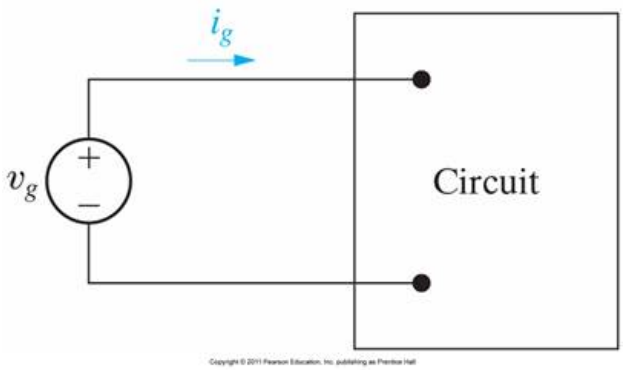
**Correct**

Marks for this submission: 10.00/10.00.

**Question 7**

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 = 35.63 + j 35.63 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)

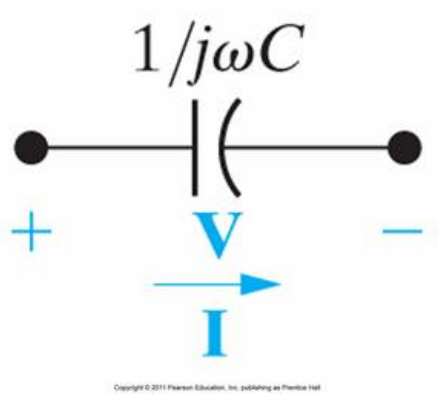
**Correct**

Marks for this submission: 10.00/10.00.

**Question 8**

Correct

Mark 10.00 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

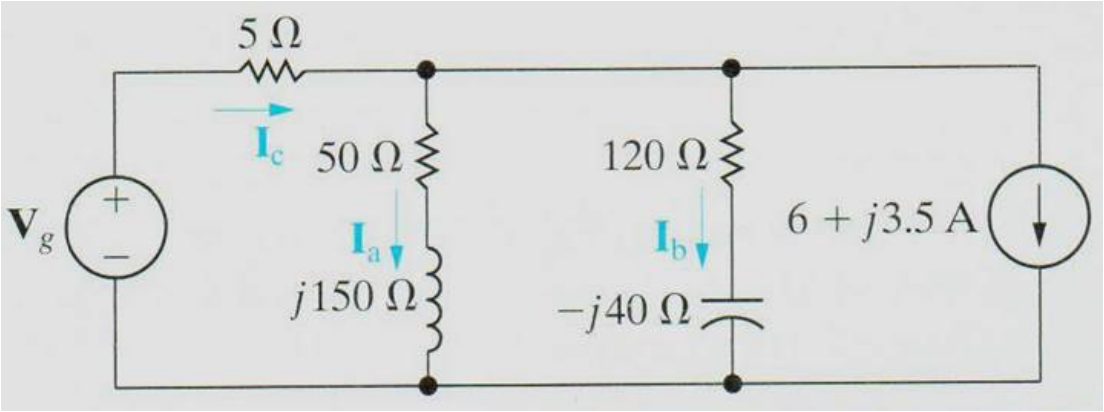
**Correct**

Marks for this submission: 10.00/10.00.

**Question 9**

Correct

Mark 10.00 out of 10.00




P9.40_7ed

Given the phasor current $\mathbf{I}_a$ = 2 Ð0° 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 36.87 ✓ Degrees Amps

$\mathbf{V}_g$ = Magnitude 358.469 ✓ at Angle 67.01 ✓ Degrees Volts

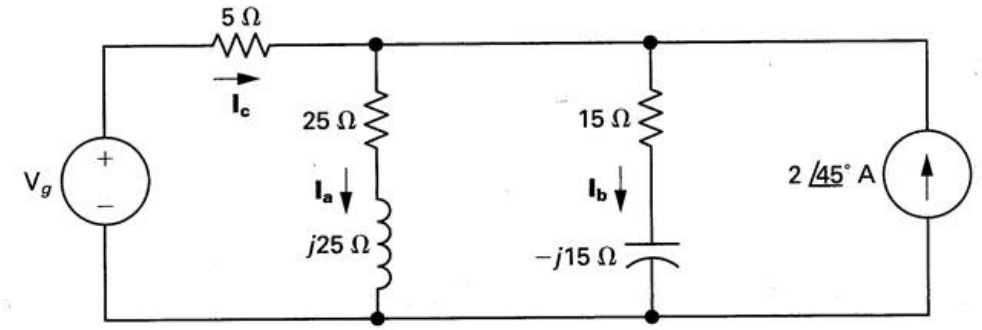
**Correct**

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 Ð45° A (magnitude 5 with angle 45 degrees Amps).

Find the following phasor values:

$\mathbf{I}_a$ = Magnitude 2.99 ✓ at Angle -45 ✓ Degrees Amps

$\mathbf{I}_c$ = Magnitude 4.236 ✓ at Angle 0 ✓ Degrees Amps

$\mathbf{V}_g$ = Magnitude 127.83 ✓ at Angle 0 ✓ Degrees Volts

**Correct**

Marks for this submission: 10.00/10.00.