Started on	Thursday, 10 November 2016, 1:05 PM
State	Finished
Completed on	Thursday, 10 November 2016, 1:05 PM
Time taken	6 secs
Grade	**79.67** out of 100.00

Question 1

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 $x(t) = \cos(\omega t + \varphi°)$

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

$x(t) =$ 483.86 ✓ $\cos(300t +$ -48.49 ✓ $°)$

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

$y(t) =$ 120.5 ✓ $\cos(377\,t +$ 4.8 ✓ $°)$

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

$v(t) =$ 152.88 ✓ $\cos(100\,t +$ 32.94 ✓ $°)$

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

$w(t) =$ 0 ✓ $\cos(\omega\,t +$ 0 ✓ $°)$

Numeric Answer

a) $x(t) = 483.858\cos(300\,t - 48.48°)$

b) $y(t) = 120.512\cos(377\,t + 4.80°)$

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

d) $w(t) = 0\cos(\omega\,t + 0°)$

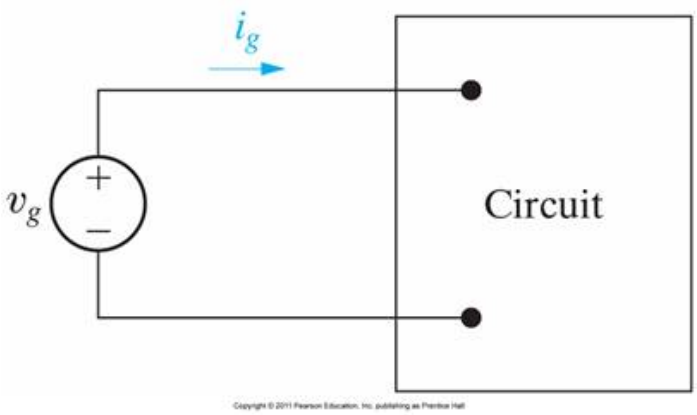
Correct

Marks for this submission: 10.00/10.00.

Question 2

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 = 35.36 ✓ + j 35.36 ✓ 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)

Numeric Answer

a) Z = 35.355 + j 35.355 Ω

b) t_{lag} = 50 µs

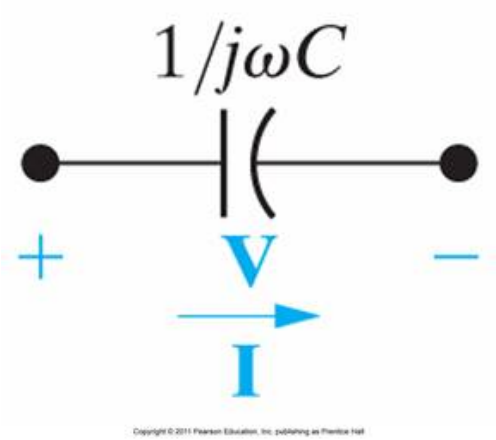
Correct

Marks for this submission: 10.00/10.00.

Question 3

Correct

Mark 10.00 out of 10.00



AP9.04_9ed

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

a) Calculate the capacitive reactance.

X_C = -50 ✓ Ohms

b) Calculate the impedance of the capacitor.

Z_C = j -50 ✓ Ohms

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

I = Magnitude 0.6 ✓ with Angle 115 ✓ Degrees Amps

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

i(t) = 0.6 ✓ cos (4000 ✓ t + 115 ✓°) Amps

Numeric Answer

a) X_C = -50 Ω (Ohm)

b) Z_C = -j50 Ω (Ohm)

c) I = 0.6Ð115° Volts

d) i(t) = 0.6 cos (4,000t + 115°) Volts

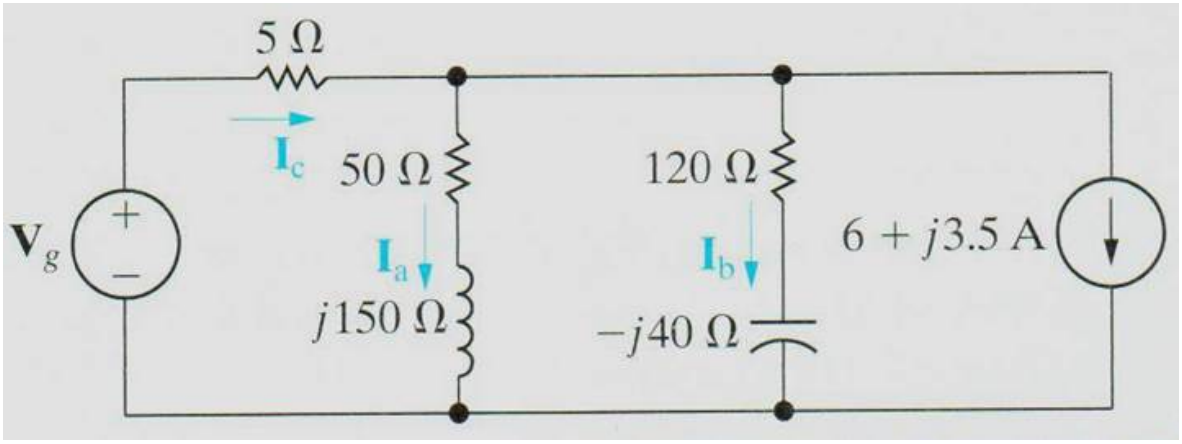
Correct

Marks for this submission: 10.00/10.00.

Question 4

Partially correct

Mark 1.67 out of 10.00



P9.40_7ed

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

Find the following phasor values:

$\mathbf{I}_b$ = Magnitude 2.5 ✓ with Angle -53.12 ✗ ° (Degrees) Amps

$\mathbf{I}_c$ = Magnitude 9.61 ✗ with Angle 8.95 ✗ ° (Degrees) Amps

$\mathbf{V}_g$ = Magnitude 427.51 ✗ with Angle -37.9 ✗ ° (Degrees) Volts

Numeric Answer

$\mathbf{I}_b$ = 2.5 at angle 90° A

$\mathbf{I}_c$ = 10.0 at angle 36.87° A

$\mathbf{V}_g$ = 358.469 at angle 67.01° V

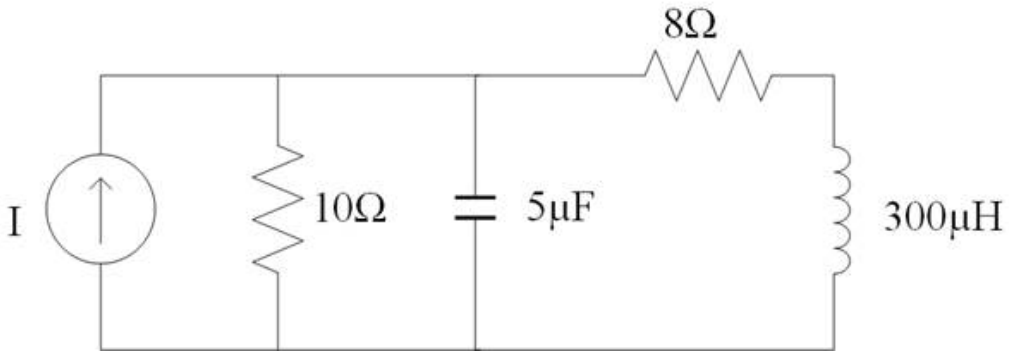
Partially correct

Marks for this submission: 1.67/10.00. Accounting for previous tries, this gives **1.67/10.00**.

Question 5

Correct

Mark 10.00 out of 10.00



P9.16_9ed

Given: $I = 922 \cos(20{,}000\, t + 30°)$ A.

What is the phasor voltage in polar form across the current source? Use the polarity of "top" equals positive voltage and "bottom" equals the reference node.

| V | = 5000.25 ✓ V

Angle = 17.47 ✓ ° (Degrees)

Numeric Answer

|V| = 5,000.25 V

Angle = 17.47 Degrees

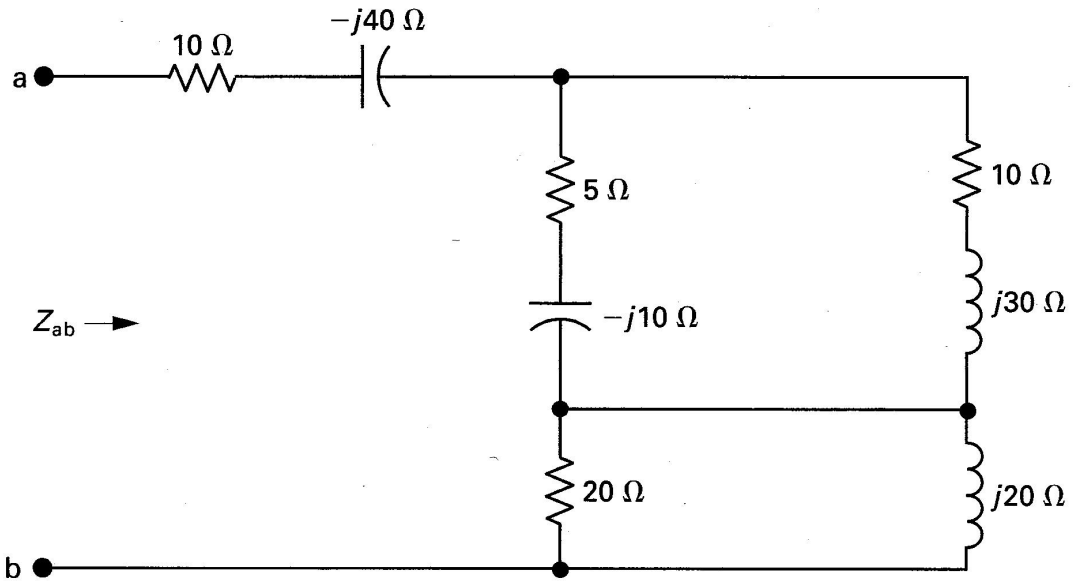
Correct

Marks for this submission: 10.00/10.00.

Question 6

Correct

Mark 10.00 out of 10.00



P9.23_6ed

Find the impedance Zab in this circuit.

Zab = 30 ✓ + j -40 ✓ Ω (Ohms) in rectangular form

Zab = Mag 50 ✓ and Angle -53.15 ✓ ° (Degrees) Ω (Ohms) in polar form

Numeric Answer

Zab = 30 - j 40 Ω (Ohms) in rectangular form

Zab = 50 at angle -53.13° Ω (Ohms) in polar form

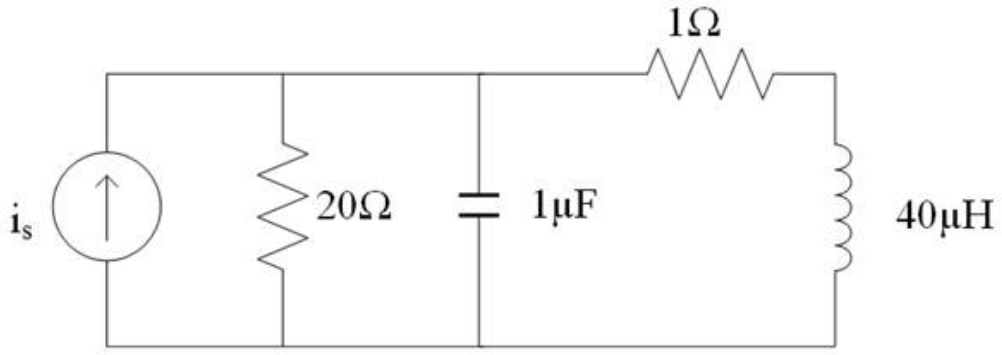
Correct

Marks for this submission: 10.00/10.00.

Question 7

Correct

Mark 10.00 out of 10.00



P9.09_6ed

Given: $i_s = 20\cos(50{,}000t - 20°)$ A.

Find the time domain voltage across the 20 Ω (Ohm) resistor.

$v_{20\Omega}(t)| =$ 46.5 ✓ $\cos(50{,}000\,t +$ 34.46 ✓ °) V

Numeric Answer

$v_{20W}(t)| = 46.5\cos(50{,}000\,t + 34.46°)$ Volts

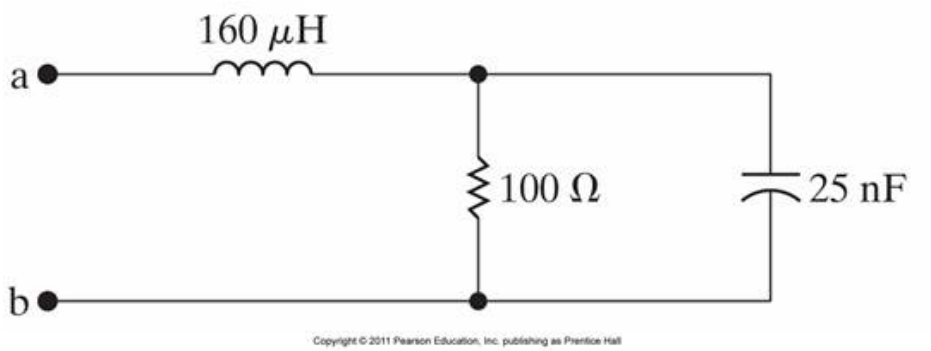
Correct

Marks for this submission: 10.00/10.00.

Question 8

Correct

Mark 10.00 out of 10.00



P9.25_9ed

a) Find the frequency (in radians per second) at which the impedance Z_{ab} of this circuit appears purely resistive.

ω (omega) = 300 ✓ k rad/sec (kilo rad/sec)

b) Find the value of Z_{ab} at the frequency of a).

Z_{ab} = 64 ✓ Ω (Ohm)

Numeric Answer

ω (omega) = 300 krad/sec (kilo rad/sec)

Z_{ab} = 64 Ω (Ohm)

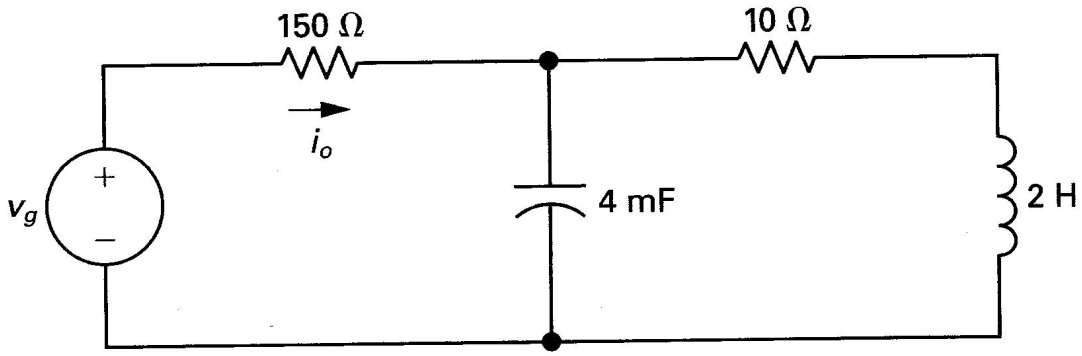
Correct

Marks for this submission: 10.00/10.00.

Question 9

Partially correct

Mark 8.00 out of 10.00



P9.16_6ed

Given: $v_g = 10\cos(\omega t)$ V.

The frequency ω (Omega) of the input voltage sinusoid is adjusted until the current i_0 is in phase with v_g.

a) Find this frequency in Hz.

f = 1.59 ✓ Hz

b) Find the equivalent impedance at this frequency.

Z_{Eq} = 50 ✗ Ω (Ohm)

c) Find the time domain current $i_0(t)$ at this frequency.

$i_0(t)$ = 50 ✓ cos(10 ✓ t + 0 ✓ °) mA (milli A)

Numeric Answer

a) f = 1.592 Hz

b) Z_{Eq} = 200 Ω (Ohm)

c) $i_0(t)$ = 50 cos(10 t) mA

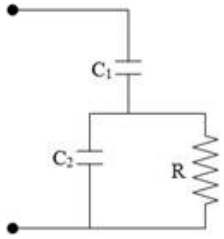
Partially correct

Marks for this submission: 8.00/10.00.

Question 10

Incorrect

Mark 0.00 out of 10.00



Given:

$C_1 = 2.5$ µF (micro F) $C_2 = 14.2$ µF (micro F) $R = 12.4$ Ω (Ohms)

The radian frequency of the driving source is 3,000 rad/sec

Find the equivalent impedance of this circuit.

Z_{Eq} = 12.35 ✗ + j -0.00015649452 ✗ Ω (Ohms)

Numeric Answer

Real{Z_{Eq}} = 9.6948 Ω (Ohms)

Imag{Z_{Eq}} = - j 138.4545 Ω (Ohms)

Incorrect

Marks for this submission: 0.00/10.00.