1. 5 V_{pk} is equivalent to:
   a. 7.07 $V_{pk\text{-}pk}$
   b. 10 $V_{pk\text{-}pk}$
   c. 2.5 $V_{pk\text{-}pk}$
   d. 25 $V_{pk\text{-}pk}$

2. 20 V_{pk} is equivalent to:
   a. 14.14 V_{rms}
   b. 28.28 V_{rms}
   c. 10 V_{rms}
   d. 40 V_{rms}

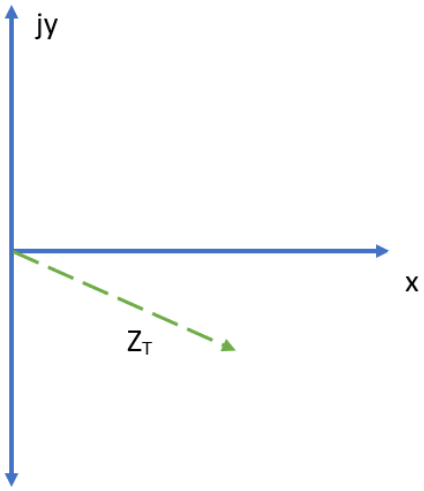
3. V(t) = 5*sin(377t + 30°)
   What is the peak value of V(t)?
   a. 3.53 V_{pk}
   b. 2.5 V_{pk}
   c. 5 V_{pk}
   d. 7.07 V_{pk}

4. At 1 kHz, a 10 µF capacitor has a reactance of:
   a. 6.28 mΩ
   b. 15.9 Ω
   c. 159 kΩ
   d. 159 Ω

5. At 60 Hz, a 22 mH inductor has a reactance of:
   a. 8.3 Ω
   b. 8.3 kΩ
   c. 1.32 Ω
   d. 121 mΩ

6. See the phasor diagram to the right. What component(s) compose Z_T?

a. Resistor
b. Inductor
c. Capacitor
d. Resistor and Inductor
e. Resistor and Capacitor
f. Inductor and Capacitor



7. As frequency increases, the reactance of a capacitor will:

a. Decrease
b. Increase
c. Remain the same
d. It depends on other factors within the circuit

8. At DC, an ideal inductor looks like:

a. A resistor
b. A capacitor
c. An open circuit
d. A short circuit

For questions 9 thru 16, express your answer in both rectangular and polar form.
Read these questions carefully!

9. $(6 \angle 40°) + (8 - 2j) =$

10. $(8 \angle 10°) - (7 \angle -10°) =$

11. $(5 - 8j) * (5 \angle 8°) =$

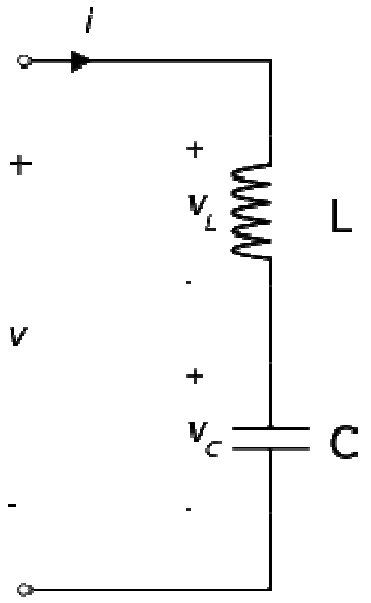
12. $\mathbf{[}\ (-10 + j) + (4 \angle 33°)\ \mathbf{]}\ /\ (-8 \angle 72°) =$

13. $\mathbf{[}\ (-41 \angle -98°) - (83 - 74j)\ \mathbf{]}\ *\ \mathbf{[}\ (96 \angle 53°) - (64 \angle -84°)\ \mathbf{]} =$

14.
$$\frac{\mathbf{[}\ (-93 - 66j) + 10j + (37j + 51)\ \mathbf{]}}{\mathbf{[}\ (75 \angle -37°) - (-47 \angle -5°) - (15 \angle 4°)\ \mathbf{]}} =$$

15.
$$\frac{\mathbf{[}\ (-65 \angle 7^{r}) + (-78 + 13j) + (42 \angle -21°)\ \mathbf{]}\ *\ \mathbf{[}\ (-5j + 94) * (-8 + 29j)\ \mathbf{]}}{\mathbf{[}\ (14 \angle -82°) + (94 \angle -55°) - (-23j + 86)\ \mathbf{]}} =$$

16.
$$\frac{\mathbf{[}\ (67 + 56j) * (-15 - 72j)\ \mathbf{]}\ +\ \mathbf{[}\ (-83 * -55j) - (-69 \angle 80°) - (-50 + 77j)\ \mathbf{]}^{2}}{\mathbf{[}\ (10 \angle 27°) + (-52 + 77j) - (92 \angle -51°)\ \mathbf{]}^{3}} =$$



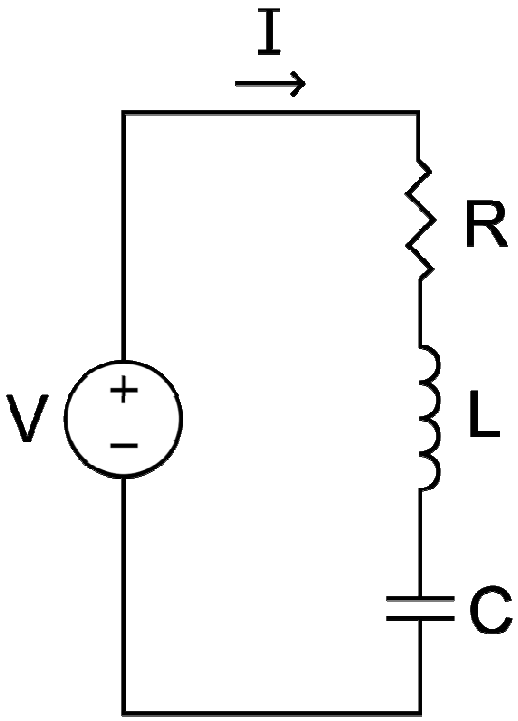
f = 15 kHz
L = 220 µH
C = 470 nF

Questions 17 thru 19 are based on the circuit above.

17. What is the total impedance of the series circuit?
a. (30.68 ∠ -48°) Ω
b. (20.73 ∠ 90°) Ω
c. (22.58 ∠ -90°) Ω
d. (1.841 ∠ -90°) Ω

18. If the applied voltage is (8 ∠ 15°) V, what is the current?
a. (261 ∠ 63°) mA
b. (386 ∠ -75°) mA
c. (354 ∠ 105°) mA
d. (4.35 ∠ 105°) A

19. What is V_L?
a. (90.1 ∠ -165°) V
b. (7.35 ∠ 105°) V
c. (8.0 ∠ -75°) V
d. (5.41 ∠ 63°) V

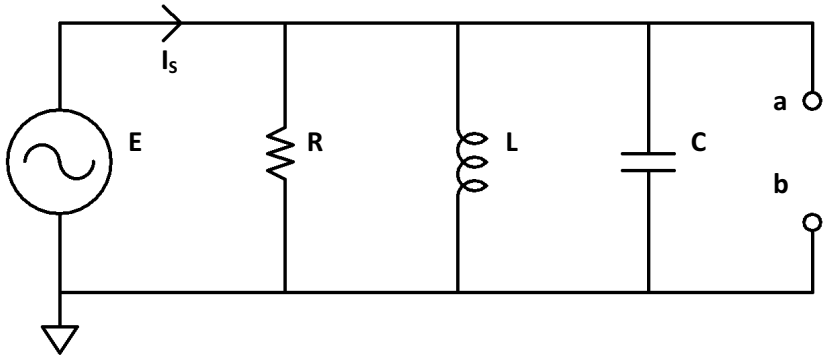


f = 480 Hz
R = 470 Ω
L = 220 mH
C = 820 nF

Questions 20 and 21 are based on the circuit above.

20. What is the total impedance of the circuit?
a. (620 ∠ -40.7°) Ω
b. (813 ∠ 54.7°) Ω
c. (537 ∠ 28.9°) Ω
d. (259 ∠ 90°) Ω

21. If the applied voltage is (120 ∠ 0°) V, what is the voltage across the resistor?
a. (876 ∠ -28.9°) mV
b. (105 ∠ -28.9°) V
c. (148 ∠ 61.1°) V
d. (90.4 ∠ -28.9°) V



f = 5 kHz
R = 771 Ω
L = 60 µH
C = 663 nF
I_S = (503 ∠126°) mA

Questions 22 thru 27 are based on the circuit above.

22. What is the total impedance seen by the source?

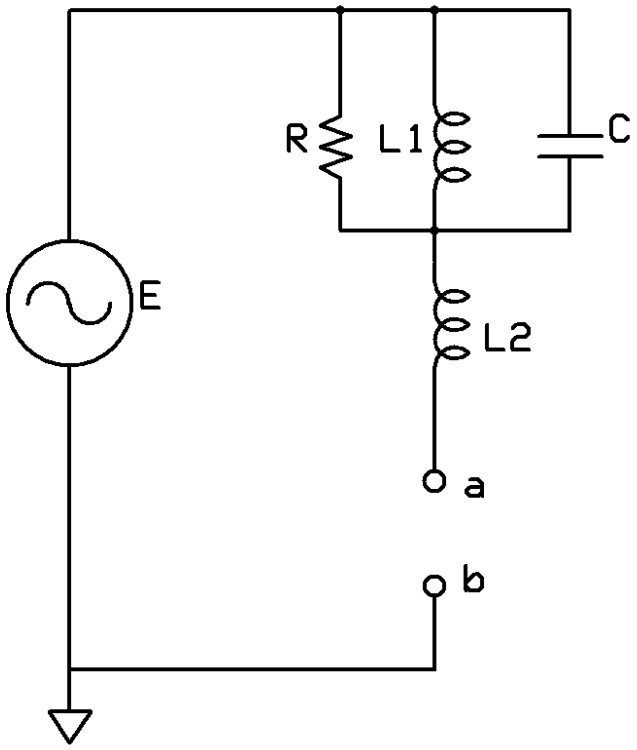
23. What is E_s?

24. What is I_C?

25. Draw the Thévenin equivalent circuit (voltage source and series impedance).

26. What load placed across terminals *a* and *b* would dissipate the most power?

27. How much average power would the load you selected in the previous question dissipate?



f = 100 kHz
R = 50 Ω
L_1 = 3.3 mH
L_2 = 33 mH
C = 100 µF
E = (1 ∠0°) V

Questions 28 thru 30 are based on the circuit above.

28. What is the Thévenin impedance of the circuit external to points *a* and *b*?

29. Draw the Norton equivalent circuit for 100 kHz (current source with completely parallel components)

30. If a 1kΩ resistor is placed across terminals *a* and *b*, how much average power will be dissipated?

31. Do you want a cookie?

a. Yes
b. No
c. Not sure
d. Depends on what kind of cookie

Changelog:

1. For question 19, the correct answer was not listed originally. It has been added.

2. For the circuit on page 8, a value for the source has been added (necessary to answer question 30).