<div align="center">
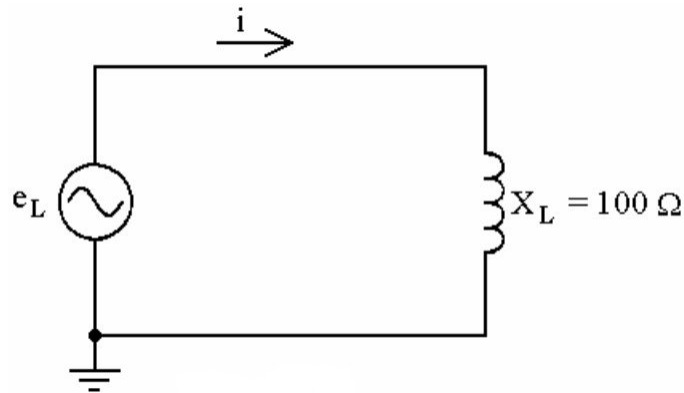
ENGG104 Tutorial 9 extra **Problems** (revision)

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Name_____   Student Number_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Figure 14.1

1) See Figure 14.1. What is the coil current if e_L is 500 sin(50t + 20°)?   1) _____
   A) 5 sin 50t   B) 5 sin(50t – 70°)
   C) 5 sin(50t + 20°)   D) 5 sin(50t + 110°)

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

2) The length of a phasor is called the modulus or magnitude.   2) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

3) Which one of the following rectangular values is equivalent to the polar form 20 ∠55°?   3) _____
   A) 16.4 – j11.5   B) 11.5 + j16.4   C) 11.5 – j16.4   D) 16.4 + j11.5

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

4) Unlike inductive reactance, capacitive reactance dissipates energy in the form of heat.   4) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

5) At what frequency does a 10 µF capacitor have a reactance of 100 Ω?   5) _____
   A) 159 Hz   B) 1.59 MHz   C) 15.9 kHz   D) 1.59 kHz
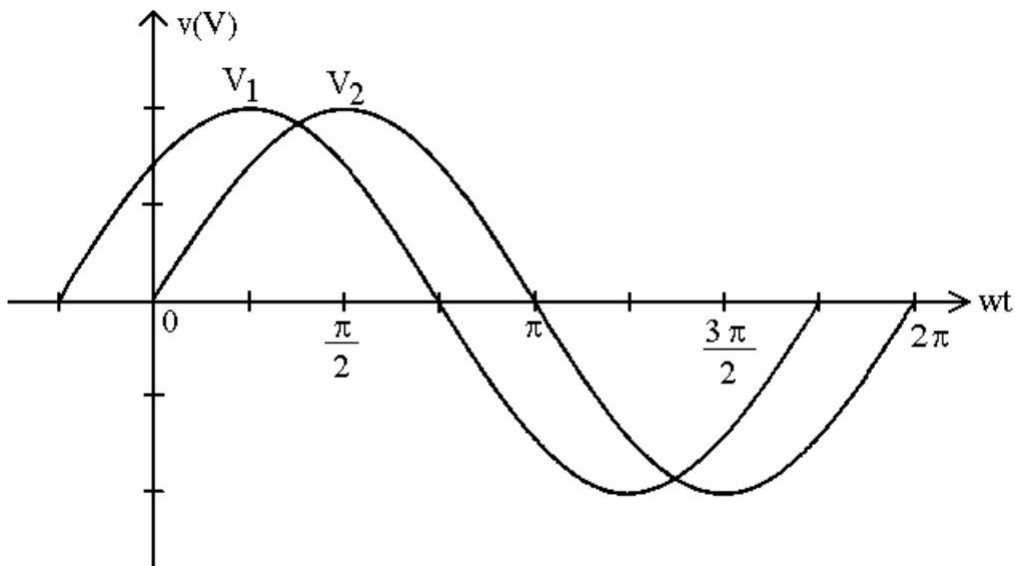
Figure 14.3

6) See Figure 14.3. What relationship exists between voltages v_1 and v_2?   6) _____
    A) v_1 lags v_2 by $(\pi/4)°$.   B) v_1 leads v_2 by 45°.
    C) v_1 leads v_2 by $(\pi/4)°$.   D) v_1 lags v_2 by 45°.

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

7) The derivative of a sine wave is a cosine wave.   7) _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

8) Convert 4 – j3 to polar form.   8) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

9) The average power, or real power is the power delivered to and dissipated by the _____.   9) _____
    A) Inductor   B) Capacitor   C) Resistor   D) Load

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

10) Reduce the expression $5\angle 60° + 3\angle{-20}°$, leaving your answer in rectangular form.   10) _____

11) Change 0 – j25 to polar form.   11) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

12) If the voltage $v = 50\sin(500t - 75°)$ is impressed across a 25 Ω resistor, which equation describes the resistor current?   12) _____
    A) $2\sin(500t - 75°)$ B) $1250\sin(500t - 75°)$
    C) $2\cos(500t - 75°)$ D) $2\sin(20t - 3°)$

13) Which relationship is true of *power factor*?   13) _____
     A) The power factor is the ratio of the total power in a circuit to the circuit current.
     B) The power factor will be lagging in a capacitive circuit.
     C) The more resistive the total impedance, the closer the power factor is to 1.
     D) The more resistive the total impedance, the closer the power factor is to 0.

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

14) For a purely resistive element, the voltage and the current through the element are in phase.   14) _____

15) Inductive reactance increases directly in proportion to frequency.   15) _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.
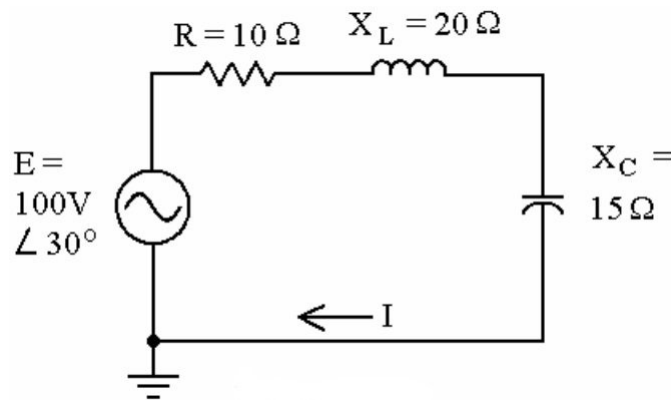

Figure 15.3

16) See Figure 15.3. Use the voltage divider rule to calculate the voltage across the coil.   16) _____

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

17) For parallel elements, the element with the smallest impedance will have the least impact on the   17) _____
total impedance at that frequency.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

18) Express the impedance of a 10 μF capacitor at 60 Hz in rectangular form.   18) _____
    A) $0\ \Omega - j265.3\ \Omega$ B) $0\ \Omega - j0.00377\ \Omega$
    C) $265.3\ \Omega - j0\ \Omega$ D) $0\ \Omega + j265.3\ \Omega$

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

19) The basic format for the voltage divider rule in ac circuits is unlike that for dc circuits.   19) _____

3

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

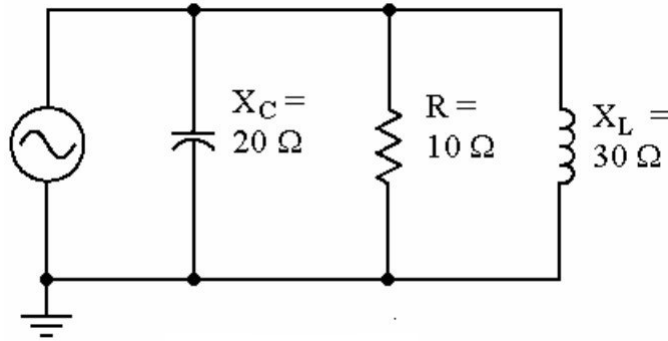**Figure 15.5**

20) See Figure 15.5. Sketch the impedance diagram for this circuit.   20) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

21) What is the reactance of a 25 millihenry coil at 600 hertz?   21) _____
    A) 785 ohms   B) 94,000 ohms   C) 94 ohms   D) 0.011 ohms

22) Ignoring capacitive effects, what is the impedance of a 250 mH coil with an internal resistance of 55   22) _____
    ohms at 60 Hz?
    A) 94.2 ohms   B) 149.2 ohms   C) 109 ohms   D) 10,900 ohms

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

23) Inductive reactance is plotted on the negative imaginary axis on an impedance diagram.   23) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

24) A measure of how well an ac circuit will admit, or allow current to flow in the circuit is _____.   24) _____
    A) Resistance   B) Inductance   C) Admittance   D) Capacitance

25) Ignoring any effects of dc resistance, what is the total reactance of a 250 mH coil in series with a 4.7   25) _____
    microfarad capacitor at a signal frequency of 60 Hz?
    A) 659 ohms   B) 111 ohms   C) 113 ohms   D) 470 ohms

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

26) Power factor can be determined by forming the ratio of the total circuit resistance to the magnitude   26) _____
    of the total circuit impedance.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

27) Which one of the following is true of ac circuits with reactive elements?   27) _____
    A) Depending on the frequency applied, the circuit can look either inductive or capacitive.
    B) The magnitude of the voltage across any one element can never exceed the applied voltage.
    C) The smaller the resistive element of a circuit, the closer the power factor is to unity.
    D) The impedance of any one element can never exceed the total network impedance.
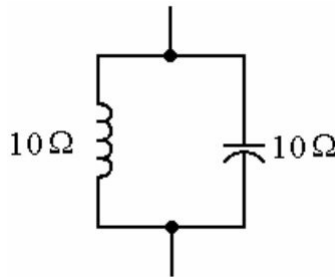
TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

28) The advantage of an impedance diagram is that it will reflect all impedance on the positive real axis.

28) _____

29) Impedance is the combination of capacitive reactance, inductive reactance, and dc resistance.

29) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

30) Ignoring inductive effects, what is the impedance of a RC series capacitor made up of a 56 Kilohm resistor and a 0.033 microfarad capacitor at a signal frequency of 450 Hz?

30) _____

    A) 10.7 kilohms   B) 66.7 kilohms   C) 45.3 kilohms   D) 57.0 kilohms

Figure 16.2

31) See Figure 16.2. What is the total impedance Z_T for this circuit?

31) _____

    A) 100 Ω ∠0°   B) 0 Ω ∠0°   C) 5 Ω ∠0°   D) infinity

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

32) The equivalent circuit is used in determining the source current in series–parallel ac networks.

32) _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.
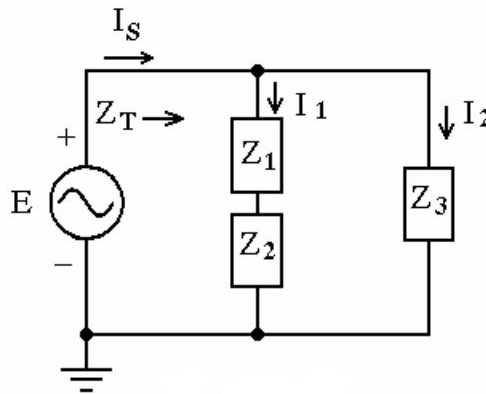
Figure 16.3

33) See Figure 16.3. Which one equation describes source voltage E?

33) _____

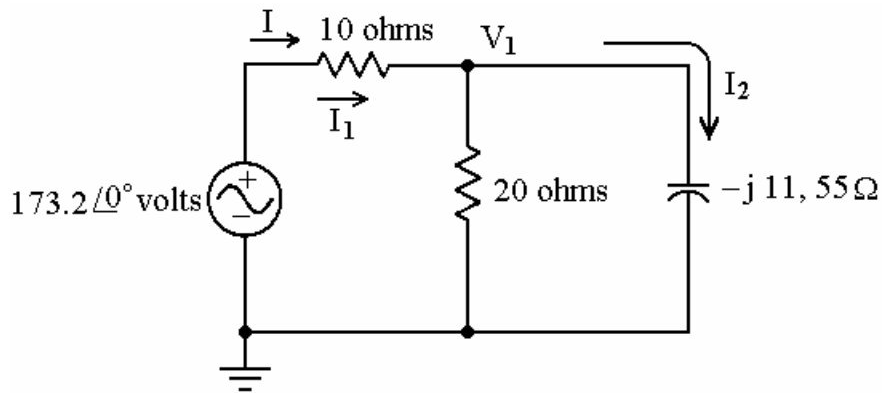   A) $E = I_S^2 Z_T$ B) $E = I_S \div Z_T$ C) $E = I_S Z_T$ D) $E = Z_T \div I_S$

Figure 16.9

34) For the circuit shown in Figure 16.9, the current flowing through the 10 Ω resistor is   34) _____
    A) 5 ∠–30°   B) 10 ∠30°   C) 173.2 ∠0°   D) 8.66 ∠60°

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

35) The use of a ground fault circuit interrupter does not mean a person will not receive a shock,   35) _____
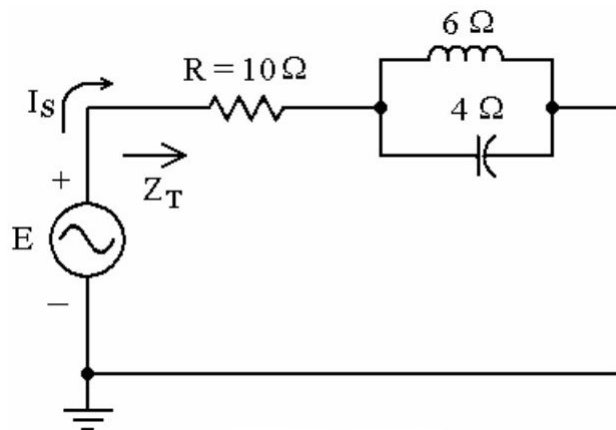   however it will shut off power quickly.

Figure 16.1

36) See Figure 16.1. I_S may be found by dividing E by Z_T.   36) _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

37) For many single source, series–parallel networks, the analysis is one that works back to the   37) _____
    source, determines the _____, and then finds its way to the desired unknown.

6

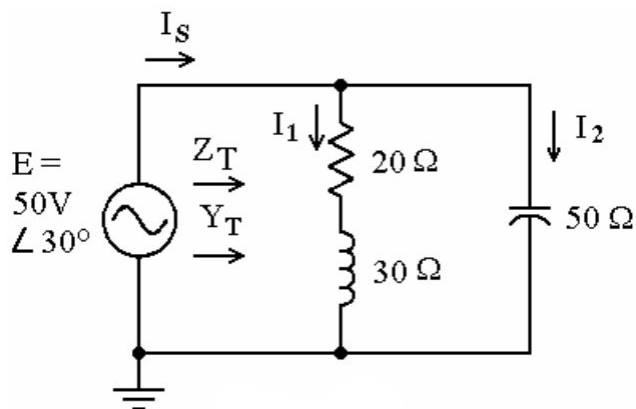**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

Figure 16.5

38) See Figure 16.5. What is the value of current I_2? 38) _____

    A) 1.39 A ∠−26.3°   B) 1 A ≥120°   C) 0.72 A ∠26.3°   D) 1 A ≥−120°
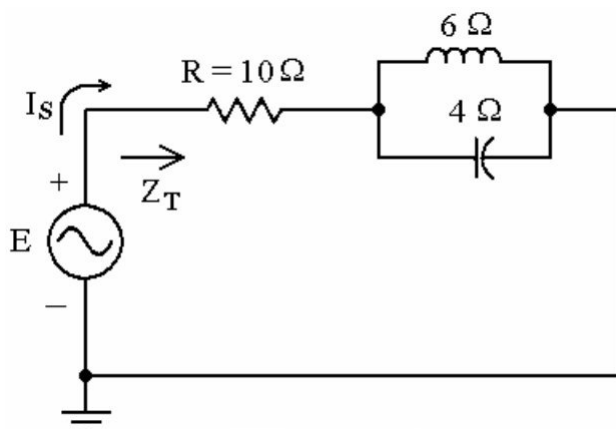
Figure 16.1

39) See Figure 16.1. What is the total impedance Z_T of this circuit? 39) _____

    A) 10 Ω + j12 Ω   B) 10 Ω − j12 Ω   C) 10 Ω − j2 Ω   D) 10 Ω − j2.4 Ω
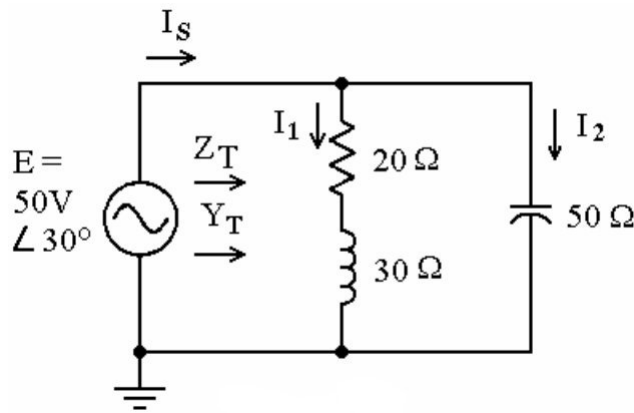
Figure 16.5

40) See Figure 16.5. What is the value of current I_1? 40) _____
    A) 1 A ∠−120°   B) 1 A ∠120°   C) 0.72 A ∠26.3°   D) 1.39 A ∠−26.3°

TRUE/FALSE. Write 'T' if the statement is true and 'F' if the statement is false.

41) The higher the frequency, the better the short–circuit approximation for X_C for ac conditions. 41) _____

42) Determining the source current is the most critical step in solving series–parallel ac networks. 42) _____

43) In a series–parallel circuit, if e = 50 V ∠20° and i = 25 A ∠20°, then the total impedance Z_T is purely 43) _____
resistive.

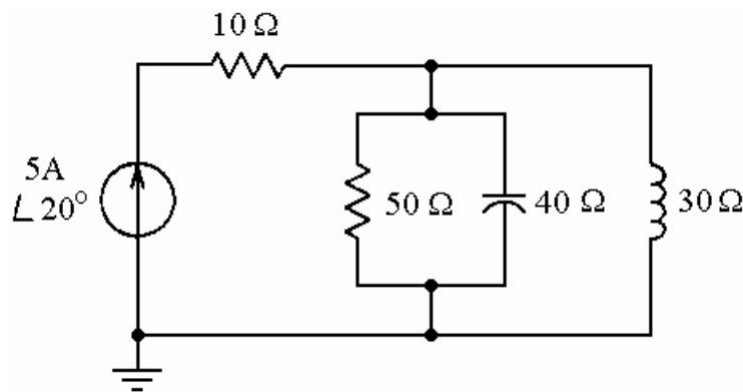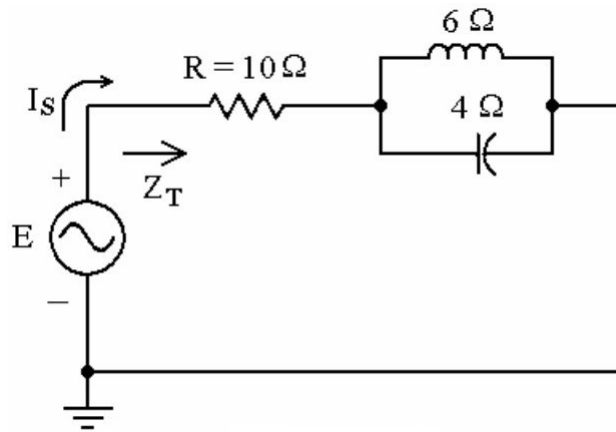**SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.**

Figure 16.7

44) See Figure 16.7. Find the voltage across the coil. 44) _____

Figure 16.1

45) A 1 kHz signal E is applied in the circuit shown in Figure 16.1. What is the value of inductor L?   45) _____
   A) 1910 μH   B) 955 μH   C) 1047 μH   D) 26.5 μH