Final
ECET 207, Purdue University North Central

Name_____

1) If the *effective* voltage of an ac receptacle is 120V, what is the *peak-to-peak* voltage? 1) _____
A) 240 V B) 339 V C) 170 V D) 84.8 V

2) Which of the following will be necessary to increase the frequency of a sinusoidal waveform? 2) _____
A) Decrease the time period between successive repetitions
B) Increase the amplitude
C) Reverse polarity
D) Increase the time period between successive repetitions

3) What are the period and frequency of a periodic wave that has 12 cycles in 46 milliseconds? 3) _____

4) What is the inductive reactance at 800 Hz of a 1 mH inductor with an internal resistance of 20 Ω? 4) _____
A) 20 Ω B) 12 Ω C) 5.0 Ω D) 0.2 Ω

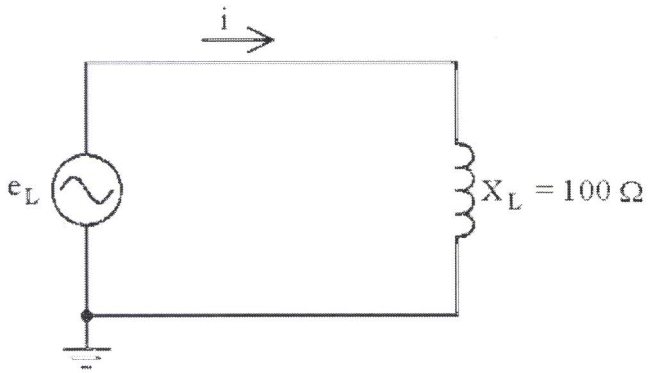

Figure 14.1

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

6) What is the susceptance of a 100 μF capacitor at 1000 Hz? 6) _____
A) 10^4 S B) 0.63 S C) 1.59 S D) 10^{-4} S

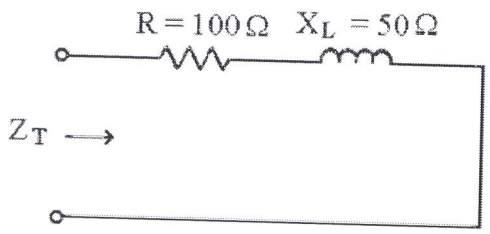

Figure 15.6

7) See Figure 15.6. Which one of the following combinations is equivalent to the given series circuit? 7) _____

A) R = 40 Ω in parallel with X_L = 20 Ω.
B) R = 250 Ω in parallel with X_L = 125 Ω.
C) R = 125 Ω in parallel with X_L = 250 Ω.
D) R = 20 Ω in parallel with X_L = 40 Ω.

8) Ignoring any effects of dc resistance, what is the total reactance of a 250 mH coil in series with a 4.7 microfarad capacitor at a signal frequency of 1000 Hz? 8) _____

A) 1570 ohms
B) 35 ohms
C) 1540 ohms
D) 1600 ohms

9) If you need an LC circuit to be resonant at 2500 Hz, and use a 150 mH coil, what should the capacitance value be? 9) _____

A) 0.015 microfarads
B) 0.027 microfarads
C) 27 microfarads
D) 0.15 microfarads

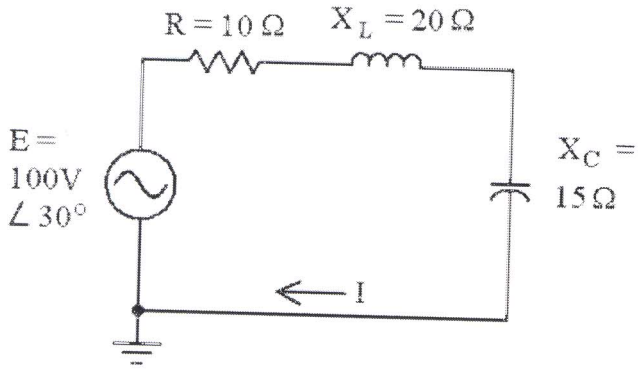

Figure 15.3

10) See Figure 15.3. Calculate the current I. 10) _____

11) See Figure 15.3. Use the voltage divider rule to calculate the voltage across the coil. 11) _____

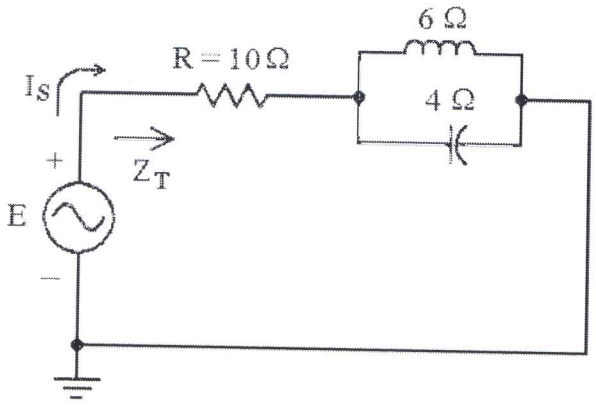

Figure 16.1

12) See Figure 16.1. If $I_S = 1$ A $\angle 80°$, what is the current through the coil? 12) _____

A) 2 A $\angle 100°$ B) 2 A $\angle -100°$ C) 0.5 A $\angle -100°$ D) 0.5 A $\angle 100°$

13) A 1 kHz signal E is applied in the circuit shown in Figure 16.1. What is the value of inductor L? 13) _____

A) 1910 μH B) 955 μH C) 26.5 μH D) 1047 μH

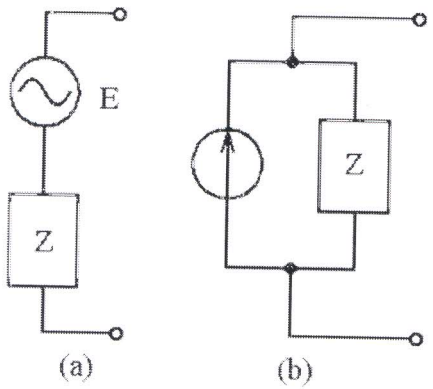

Figure 17.1

14) See Figure 17.1. The current source (a) includes a current I = 10 A $\angle 20°$ and an impedance consisting of a 10 Ω resistor in series with a 20 Ω inductive reactance. If this current source is converted to a voltage source as shown in (b), what is the value of the series impedance element Z? 14) _____

A) 20 Ω $\angle 90°$ B) 22.4 Ω $\angle 63.4°$ C) 10 Ω $\angle 0°$ D) 22.4 Ω $\angle 26.6°$

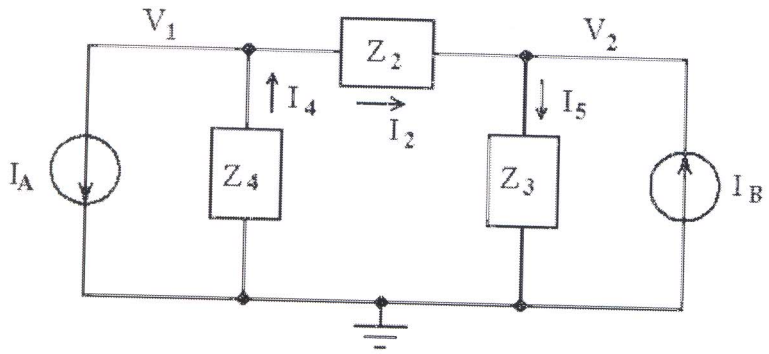

Figure 17.3

15) See Figure 17.3. When setting up this circuit for nodal analysis solution, which one equation describes node 1? 15) _____

A) $I_4 = I_A + I_2$ B) $I_A = I_4$ C) $I_2 = I_4 - I_3$ D) $I_3 = I_A + I_4$

16) See Figure 17.3. Which one equation describes current I_2? 16) _____

A) $I_2 = I_4 + I_A$ B) $I_2 = (V_1 + V_2)/Z_2$

C) $I_2 = (V_1 - V_2)/Z_2$ D) $I_2 = -I_A$

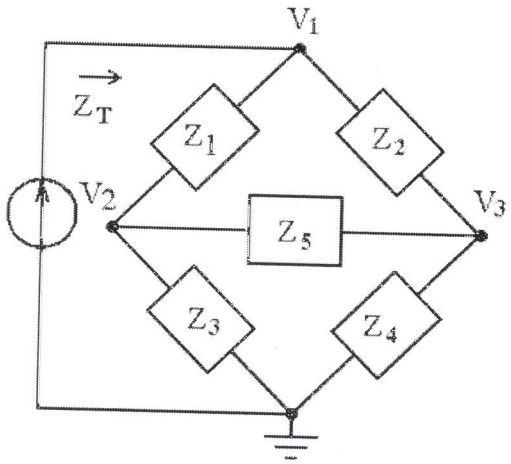

Figure 17.4

17) See Figure 17.4. In a general bridge circuit such as this, what condition will result in a balanced bridge? 17) _____

A) $Z_1Z_3 = Z_2Z_4$ B) $Z_3 = Z_4$ C) $Z_1Z_4 = Z_2Z_3$ D) $Z_1Z_2 = Z_3Z_4$

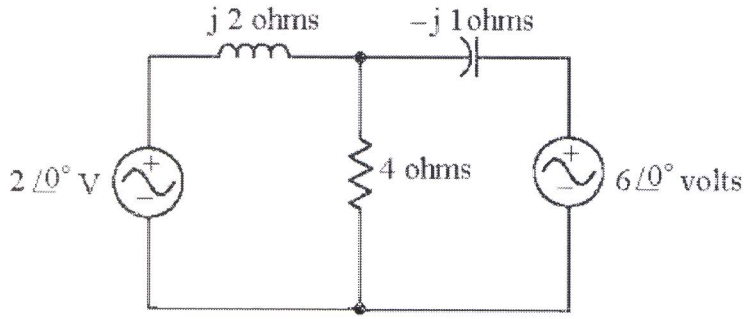

Figure 17.8

18) Referring to the circuit shown in Figure 17.8, determine the current through the 2 Ω inductor, by using Mesh Analysis. 18) _____

A) 20.0 A ∠–143° B) 3.61 A ∠124° C) 4.47 A ∠153°

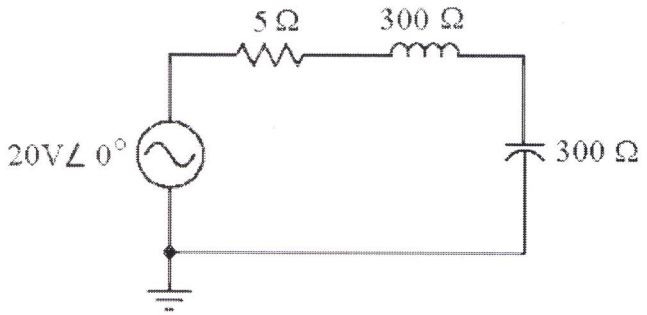

Figure 20.2

19) See Figure 20.2. What is the source current at resonance? 19) _____

A) 0.25 A ≥0° B) 66.7 mA ≥+90° C) 4 A ≥0° D) 66.7 mA ≥–90°

20) See Figure 20.2. What is the voltage across the resistor in this resonant circuit? 20) _____

A) 1200 V B) 1180 V C) 20 V D) 80 V

21) See Figure 20.2. If the resonant frequency is 10 kHz, what is the bandwidth? 21) _____

A) 167 Hz B) 10,000 Hz C) 7071 Hz D) 5000 Hz

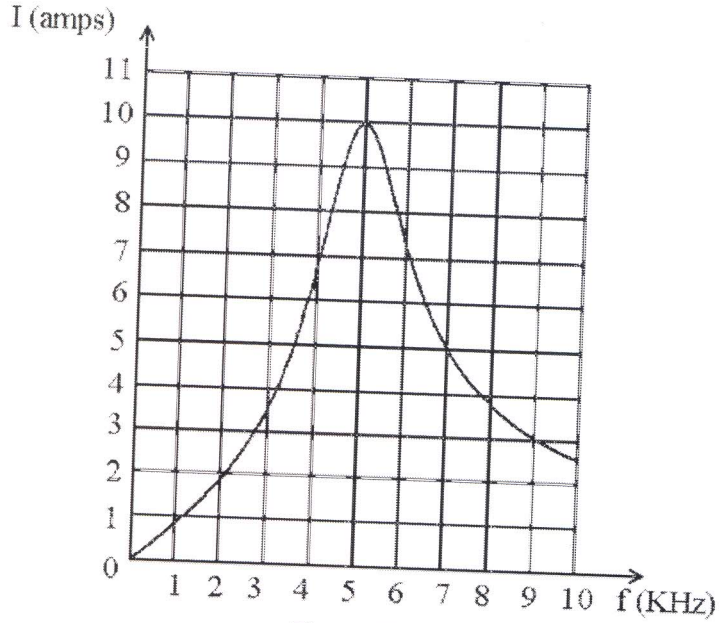

Figure 20.4

22) See Figure 20.4. This curve describes a series resonant circuit. What is the approximate bandwidth of this circuit? 22) _____

A) 3.45 kHz B) 1.9 kHz C) 5.0 kHz D) 2.5 kHz

23) What power level is 3 dB above 10 W? 23) _____

A) 10 W B) 13 W C) 14.1 W D) 20 W

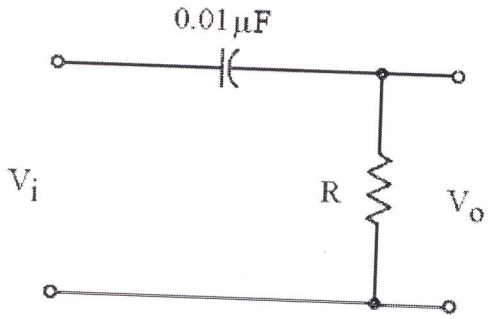

Figure 21.2

24) See Figure 21.2. At the cutoff frequency f_c, 24) _____

A) V_o leads V_i by 45° B) V_o lags V_i by 45°

C) V_o leads V_i by 90° D) V_o lags V_i by 90°

25) See Figure 21.2. V_i has a peak amplitude of 10 V. In reality, what is the peak amplitude of V_o at the cutoff frequency f_c ? 25) _____

A) 10 V B) 5 V C) 20 V D) 7.07 V

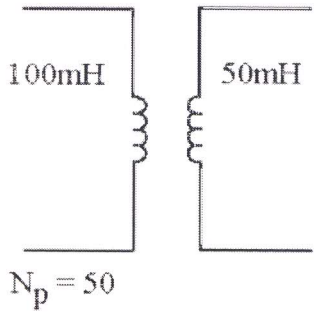

Figure 22.1

26) See Figure 22.1. What is the induced voltage e_p in the primary if the primary flux changes at 300 mWb/s? 26) _____

A) 15 V B) 3000 V C) 6 V D) 1.2 V

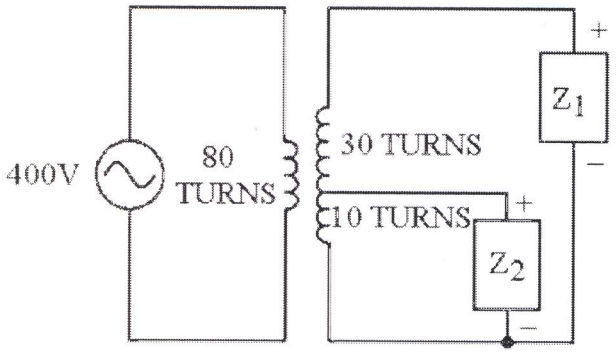

Figure 22.6

27) See Figure 22.6. Determine the voltage E_2 across Z_2. 27) _____

A) 200 V B) 50 V C) 3200 V D) 150 V

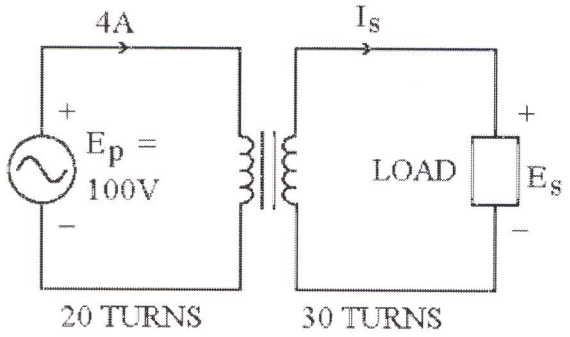

Figure 22.3

28) See Figure 22.3. What is the transformation ratio for this transformer? 28) _____

A) 0.667 B) 30 C) 1.5 D) 20

29) See Figure 22.3. What is the voltage E_S across the load? 29) _____

A) 66.7 V B) 100 V C) 150 V D) 120 V

30) See Figure 22.3. What is the current I_S through the load? 30) _____

A) 6 A B) 2.67 A C) 4 A D) 1.5 A

31) Five watts are dissipated in a primary (input) circuit that includes a perfectly matched, ideal transformer with a primary to secondary turns ratio of 15:1. If the input resistance is 2000 Ω, what is the load resistance? 31) _____

A) 79 Ω B) 6243 Ω C) 30,000 Ω D) 133 Ω E) 8.9 Ω

32) **NOTE: The following questions are all part of the same Research and Development (R&D) problem** 32) _____

An Electrocardiogram (ECG) is the electrical recording of a patient's heart activity. Normal range for a ECG signal is 1 mVp-p at 0.6 - 2 Hz. Outside electrical noise from other equipment being used in patient treatment must be removed for a clean ECG signal. This noise includes frequencies ranging from 60 Hz and up. A circuit to process the signal needs to be designed.

What type of filter should be used?

A) Stop-band B) Low-pass C) Pass-band D) High-pass

33) Due to a time crunch, you must use the parts on-hand in the shop inventory. You can find a 0.047 microfarad capacitor and a 500 kOhm potentiometer. What should the potientiometer be set to for fc=10 Hz? 33) _____

34) The input to the processing portion of the ECG machine needs a 5 Vp-p signal. What is the needed gain from the amplifer in dB? 34) _____

35) This circuit will have a second filter in parallel, allowing a 500 kHz signal used for respiration monitoring to pass through. Using another 0.047 microfarad capacitor from the bin and a variable inductor, what will the inductor need to be set to for the pass-band portion of the filter so fs=500kHz? 35) _____

A) 3.5 uH B) 8.5 uH C) 2.16 uH D) 26 uH