GIBILISCO PROBLEMS

1. A battery delivers 12 V to a bulb. The current in the bulb is 3 A. What is the resistance of the bulb?
   a. 36 Ω
   b. **4 Ω**
   c. 0.25 Ω
   d. 108 Ω
   e. 0.75 Ω
2. A resistor has a value of 680 ohms, and a tolerance of plus or minus 5 percent. Which of the following values indicates a reject?
   a. 648 Ω
   b. 712 Ω
   c. 699 Ω
   d. **636 Ω**
   e. 707 Ω
3. A battery supplies 6.0 V to a bulb rated at 12 W. How much current does the bulb draw?
   a. **2.0 A**
   b. 0.5 A
   c. 72 A
   d. 40 mA
   e. 72 mA
4. A 6-V battery is connected across a series combination of resistors. The resistance values are 1, 2, and 3 Ω. What is the current through the 2- Ω resitor?
   a. **1 A**
   b. 3 A
   c. 12 A
   d. 24 A
   e. 72 A
5. A battery delivers 12 V across a set of six 4- Ω voltage dividing combination. This provides six different voltages, differing by an increment of:
   a. 1/4 V
   b. 1/3 V
   c. 1 V
   d. **2 V**
   e. 3 V
6. A 24-V battery is connected across a set of four resistors in parallel. Each resistor has a value of 32 ohms. What is the total power dissipated by the resistors?
   a. 0.19 W
   b. 3 W
   c. 192 W
   d. 0.33 W
   e. **72 W**
7. A 12-V battery is connected to a set of three resistors in series. The resistance values are 1,2, and 3 ohms. What is the voltage across the 3- Ω.
   a. 1 V
   b. 2 V
   c. 4 V
   d. **6 V**
   e. 12 V
8. Nine 90-ohm resistors are connected in a 3x-parallel network. The total resistance is:
   a. 10 Ω
   b. 30 Ω
   c. **90 Ω**
   d. 270 Ω
   e. 810 Ω
9. A 100-W bulb burns for 100 hours. It has consumed:
   a. 0.10 kWh
   b. 1.00 kWh
   c. **10.0 kWh**
   d. 100 kWh
   e. 1000 kWh
10. A 6.00-V battery is connected to a parallel combination of two resistors, whose values are 8.00 Ω 12.0 Ω. What is the power dissipated in the 8- Ω resistor.
    a. 0.300 W
    b. 0.750 W
    c. **1.25 W**
    d. 1.80 W
    e. 4.50 W
11. A sine wave has a peak value of 30.0 V. Its rms value is:
    a. **21.2 V**
    b. 30.0 V
    c. 42.4 V
    d. 60.0 V
    e. 90.0 V
12. Four capacitors are connected in parallel. Their values are 100 pF each. The net capacitance is:
    a. 25 pF
    b. 50 pF
    c. 100 pF
    d. 200 pF
    e. **400 pF**
13. A transformer has a primary-to-secondary turns ratio of exactly 8.88:1. The input voltage is 234 V rms. The output voltage is:
    a. 2.08 kV rms

b. 18.5 kV rms
c. 2.97 V rms
d. **26.4 V rms**
e. 20.8 V rms

14. A transmission line carries 3.50 A of ac current and 150 V ac. The true power in the line is:
    a. 525 W
    b. 42.9 W
    c. 1.84 W
    d. **Meaningless; true power is dissipated, not transmitted.**
    e. Variable, depending on standing wave effects.
15. A wave has a frequency of 200 kHz. How many degrees of phase change occur in a microsecond (a millionth of a second)?
    a. 180 degrees
    b. 144 degrees
    c. 120 degrees
    d. 90 degrees
    e. **72 degrees**
16. At a frequency of 2.55 MHz, a 330-pF capacitor has a reactance of:
    a. −5.28 Ω
    b. −0.00528 Ω
    c. **−189 Ω**
    d. −18.9k Ω
    e. −0.000189 Ω
17. A transformer has a step-up turns ratio of 1:3.16. The output impedance is 499Ω purely resistive. The input impedance is:
    a. **50.0 Ω**
    b. 158 Ω
    c. 1.58k Ω
    d. 4.98k Ω
    e. Not determinable from the data given.
18. Avcomplex impedance is represented by 34 - j23. The absolute-value impedance is:
    a. 34 Ω
    b. 11 Ω
    c. -23 Ω
    d. **41 Ω**
    e. 57 Ω
19. A coil has an inductance of 750 µH. The inductive reactance at 100 kHz is:
    a. 75.0 Ω
    b. 75.0 k Ω
    c. **471 Ω**
    d. 47.1 k Ω
    e. 212 Ω
20. Two complex impedances are in series. One is 30+j50 and the other is 50 − j30. The net impedance is:
    a. 80+ j80
    b. 20+ j20
    c. 20 - j20
    d. -20+ j20
    e. **80+ j20**
21. Two inductors, having values of 140 µH and 1.50 mH, are connected in series. The net inductance is:
    a. 141.5 µH
    b. 1.64 µH
    c. 0.1415 mH
    d. **1.64 mH**
    e. 0.164 mH
22. A 50 Ω feed line needs to be matched to an antenna with a purely resistive impedance of 200 Ω A quarter-wave matching section should have:
    a. Zo = 150 Ω
    b. Zo = 250 Ω
    c. Zo = 125 Ω
    d. Zo = 133 Ω
    e. **Zo = 100 Ω**
23. A capacitor of 470 pF is in parallel with an inductor of 4.44 µH. What is the resonant frequency?
    a. **3.49 MHz**
    b. 3.49 kHz
    c. 13.0 MHz
    d. 13.0 GHz
    e. Not determinable from the data given.
24. Three capacitors are connected in series. Their values are 47 µF, 68 µF, and 100 µF. The total capacitance is:
    a. 215 µF
    b. Between 68 µF and 100 µF
    c. Between 47 µF and 68 µF
    d. **22 µF**
    e. Not determinable from the data given.
25. A series circuit has a resistance of 50 Ω and a capacitive reactance of −37 Ω. The phase angle is:
    a. 37 degrees
    b. 53 degrees
    c. **−37 degrees**
    d. −53 degrees
    e. Not determinable from the data given.

26. A 200 Ω resistor is in series with a coil and capacitor; XL = 200 Ω and XC = −100 Ω. The complex impedance is:
    a. 200 - j100
    b. 200 - j200
    c. **200 + j100**
    d. 200 + j200
    e. Not determinable from the data given.
27. The period of a wave is 2 X 10−8 second. The frequency is:
    a. 2 X 108 Hz
    b. 20 MHz
    c. 50 kHz
    d. **50 MHz**
    e. 500 MHz
28. A series circuit has a resistance of 600 Ω and a capacitance of 220 pF. The phase angle is:
    a. −20 degrees
    b. 20 degrees
    c. −70 degrees
    d. 70 degrees
    e. **Not determinable from the data given.**
29. Three coils are connected in parallel. Each has an inductance of 300µH. There is no mutual inductance. The net inductance is:
    a. **100 µH**
    b. 300 µH
    c. 900 µH
    d. 17.3 µH
    e. 173 µH
30. An inductor shows 100 Ω of reactance at 30.0 MHz. What is its inductance?
    a. **0.531 µH**
    b. 18.8 mH
    c. 531 µH
    d. 18.8 µH
    e. It can't be found from the data given.
31. A power gain of 30 dB is equivalent to an amplification factor of:
    a. 0.001
    b. 1/30
    c. 30
    d. **1000**
    e. None of the above.
32. An amplifier has a dc collector power input of 300 W, and is 75.0 percent efficient. The signal output power is:
    a. 400 W
    b. 300 W
    c. **225 W**
    d. Variable, depending on the bias.
    e. Impossible to determine from this data.
33. An amplifier has an output signal voltage that is 35 times the input signal voltage. This is a gain of:
    a. 15 dB
    b. **31 dB**
    c. 35 dB
    d. 350 dB
    e. 700 dB
34. A radio antenna receives 50 watts of RF power from a transmitter, and radiates 49 watts of that power into space. Which of the following statements is true?
    a. **The antenna is 98 percent efficient.**
    b. The loss resistance is 1 ohm.
    c. The loss resistance is 1 percent.
    d. The ground loss is 1 watt.
    e. The antenna feed line loss is 1 watt.
35. A circuit has a battery of 3.0 V and a bulb with a resistance of 12.0 ohms. The current through the bulb is:
    a. 36 A
    b. 4.0 A
    c. **250 mA**
    d. 40 mA
    e. 36 mA
36. Two 400-µH inductors are connected in series. There is no mutual inductance. The total inductance is:
    a. 100 µH
    b. 200 µH
    c. 400 µH
    d. **800 µH**
    e. 1.6 mH
37. Three resistances are in parallel, with values of 100, 200, and 300 ohms. The current through the 200-ohm resistor is 500 mA. What is the voltage across the whole combination?
    a. There isn't enough information to figure it out.
    b. 400 V
    c. 400 mV
    d. **100 V**
    e. 100 mV
38. A circuit has a complex impedance of 9 + j12. The absolute-value impedance is:
    a. **15 ohms**

b. 9 ohms
c. 12 ohms
d. 21 ohms
e. Impossible to calculate from this data.

39. Three resistors, each of 30 ohms, are connected in parallel. The net resistance is:
    a. 90 ohms
    b. 60 ohms
    c. 33 ohms
    d. **10 ohms**
    e. Impossible to determine from the data given.
40. A resistor has a positive temperature coefficient of 1.00 percent per degree C.If its value is 100 ohms at 20 degrees C, what is its value at 25 degrees C?
    a. 100 ohms
    b. **105 ohms**
    c. 95 ohms
    d. 125 ohms
    e. It can't be calculated from this data.
41. A coil has 20 mH of inductance. What is the inductive reactance?
    a. 20 ohms
    b. 0.05 ohms
    c. 50 ohms
    d. 20k ohms
    e. **There isn't enough information given here to figure it out**.
42. A transformer has a primary-to-secondary turns ratio of 10:1. The input is 120V rms ac. The output is:
    a. 12 kV rms ac
    b. 1.2 kV rms ac
    c. 120 V rms ac
    d. **12 V rms ac**
    e. 1.2 V rms ac
43. In a certain resistance-capacitance (RC) circuit, the current leads the voltage by 45 degrees. The resistance is 50 ohms. The capacitive reactance is:
    a. 25 ohms
    b. -25 ohms
    c. 50 ohms
    d. **-50 ohms**
    e. Impossible to determine from this information.
44. The output of an amplifier circuit is 20 V and the input is 5.0 V. The input and output impedances are identical. The circuit thus has a gain of:
    a. 4 dB
    b. 6 dB
    c. **12 dB**
    d. -4 dB
    e. -6 dB
45. A resistor of 100 ohms carries 333 mA dc. The power dissipated by that resistor is:
    a. 300 mW
    b. 3.33 W
    c. 33.3 W
    d. 3.33 W
    e. **11.1 W**
46. Suppose an antenna has a radiation resistance of 35 Ω and a loss resistance of 15 Ω. What is the efficiency of the antenna?
    a. 20 percent
    b. 30 percent
    c. 43 percent
    d. **70 percent**
    e. Impossible to calculate from this information
47. What is the frequency of a pure sine wave that has a period of 50 nanoseconds? (A nanosecond is equal to one thousand-millionth, or 10−9, of a second.)
    a. 2.0 MHz
    b. **20 MHz**
    c. 0.20 GHz
    d. 2.0 GHz
    e. 20 GHz
48. Suppose a coil and capacitor are connected in series, with jXL = j 50 and jXC = −j 90, and there is no resistance. What is the complex impedance of this combination?
    a. **0 − j40**
    b. 0 + j40
    c. 40 + j50
    d. 50 − j90
    e. It cannot be determined without more information.
49. Suppose a dc circuit has 10 kΩ of resistance, and a 12-V battery is connected to it. How much current is drawn from the battery?
    a. 1.2 µA
    b. 12 µA
    c. **1.2 mA**
    d. 12 mA
    e. None of the above

50. Imagine a circuit with 21 Ω of inductive reactance and 28 Ω of resistance. What is the absolute-value impedance of this circuit?
    a. 7 Ω
    b. 24 Ω
    c. **35 Ω**
    d. 49 Ω
    e. None of the above
51. Suppose you want to use a transformer to obtain exactly 30 V rms ac from an electrical outlet that supplies exactly 120 V rms ac. The primary-to-secondary turns ratio of the transformer should be
    a. exactly 1:16
    b. exactly 1:4
    c. variable
    d. **exactly 4:1**
    e. exactly 16:1
52. What is the dc resistance of a component with a dc conductance of 10−4 S?
    a. 0.0001 Ω
    b. 0.01 Ω
    c. 100 Ω
    d. **10 kΩ**
    e. None of the above
53. Suppose an audio amplifier produces 100 W rms output when the input is 5.00 W rms. This represents a power gain of
    a. 1.30 dB
    b. 2.60 dB
    c. **13.0 dB**
    d. 20.0 dB
    e. 26.0 dB
54. Imagine four 100-µH inductors connected in a 2 × 2 series-parallel combination. Suppose there is no mutual inductance among them. What is the net inductance of this matrix?
    a. 25 µH
    b. 50 µH
    c. **100 µH**
    d. 200 µH
    e. 400 µH
55. Imagine an inductor and resistor connected in series, such that the inductive reactance and the resistance are both equal to 400 Ω at a frequency of 100 MHz. How are the instantaneous current and the instantaneous voltage related?
    a. They are in phase.
    b. They are 180° out of phase.
    c. The current leads the voltage by 90°.
    d. The current lags the voltage by 90°.
    e. **None of the above are true.**
56. Suppose you want to use a transformer to match the output of an audio amplifier to a speaker. The amplifier has a purely resistive output impedance of exactly 128 Ω. The speaker has a purely resistive impedance of exactly 8 Ω. The primary-to-secondary turns ratio of the transformer should be
    a. exactly 1:16.
    b. exactly 1:4.
    c. variable.
    d. **exactly 4:1.**
    e. exactly 16:1.
57. Suppose a coil and capacitor are connected in series, with jXL = j 40 and jXC = −j70, and the coil has an internal resistance of 10 Ω. Suppose the frequency of operation is 12.5 MHz. This circuit will exhibit resonance at
    a. some frequency below 12.5 MHz.
    b. **some frequency above 12.5 MHz.**
    c. 12.5 MHz; it is resonant under the conditions stated.
    d. any and all frequencies.
    e. no frequency, because of the internal resistance.
58. The binary number 1001101 represents which decimal number?
    a. 44
    b. 55
    c. 66
    d. **77**
    e. 88
59. Suppose a dc circuit has 10 kΩ of resistance, and a 12-V battery is connected to it. How much power is drawn from the battery?
    a. 1.2 µW
    b. 12 µW
    c. 1.2 mW
    d. 12 mW
    e. **None of the above**
60. Imagine a circuit with 21 Ω of inductive reactance and 28 Ω of resistance. What is the complex impedance of this circuit?
    a. 7 Ω
    b. 24 Ω
    c. 35 Ω
    d. 49 Ω
    e. **None of the above**
61. Suppose an audio amplifier produces 8.0 V rms output with 80 mV rms input. Suppose the

amplifier input impedance is the same as the output load impedance. What is the gain of this amplifier in this situation?

a. 20 dB
b. **40 dB**
c. 100 dB
d. 200 dB
e. We must know the actual input and output impedance values, in ohms, in order to determine the gain in this case.

62. Suppose a battery-powered circuit has 1.00 Ω of net resistance, and 15.0 A of current flows through it. How much power is demanded from the battery?

a. **225 W**
b. 150 W
c. 22.5 W
d. 66.7 mW
e. It is impossible to calculate this, based on the information given.

63. Imagine a capacitor and resistor connected in series, such that the capacitive reactance is equal to −200 Ω and the resistance is equal to 200 Ω at a frequency of 70 MHz. How are the instantaneous current and the instantaneous voltage related?

a. They are in phase.
b. They are 90° out of phase.
c. **The current leads the voltage by 45°.**
d. The current lags the voltage by 45°.
e. None of the above are true.