

**END-OF-SUBCOURSE EXAMINATION**

Circle the letter of the correct answer to each question. When you have answered all of the questions, use a Number 2 pencil to transfer your answers to the TSC Form 59.

1. What is electricity?
  - a. Charged matter.
  - b. Moving charge.
  - c. Positive charge.
  - d. Negative charge.
  
2. What is static electricity?
  - a. Ionized atoms.
  - b. Electricity at rest.
  - c. Charged particles.
  - d. Attraction and repulsion.
  
3. What is one important characteristic of magnetic lines of force?
  - a. Magnetic lines of force are conducted by all materials.
  - b. Magnetic lines of force are conducted by some materials.
  - c. Magnetic lines of force move perpendicular to each other.
  - d. Magnetic lines of force are attracted by air.
  
4. Which of the following materials makes the best electromagnet?
  - a. Copper.
  - b. Stainless steel.
  - c. Soft iron.
  - d. Silver.
  
5. Who of the following discovered and measured the force between two magnets?
  - a. Maxwell.
  - b. Gauss.
  - c. Oersted.
  - d. Coulomb.
  
6. What is the definition of the intensity of a magnetic field in which a unit magnetic pole experiences a force of one dyne?
  - a. Gauss.
  - b. Oersted.
  - c. Coulomb.
  - d. Maxwell.

7. What is the letter representation of the Gauss?
- B.
  - H.
  - M.
  - F.
8. What is the angular difference between true north and magnetic north?
- $71^\circ$ .
  - $27^\circ$ .
  - $17^\circ$ .
  - $23^\circ$ .
9. Who discovered that current is directly proportional to the voltage and inversely proportional to the resistance?
- Kirchoff.
  - Ampere.
  - Voltaire.
  - Ohm.
10. What is the applied voltage in a series circuit composed of a battery, and three resistors whose voltage drops are  $ER_1 = 10V$ ,  $ER_2 = 5V$ ,  $ER_3 = 15V$ . Use Kirchoff's Voltage Law.
- 20 V.
  - 25 V.
  - 15 V.
  - 30 V.
11. What is the formula for Kirchoff's current for parallel circuits?
- $I_T = I_1 = I_2 = I_3$ .
  - $I_T = E/R$ .
  - $I_T = I_1 + I_2 + I_3$ .
  - $I_T = \sqrt{I_1^2 + I_2^2}$ .
12. What is the unit of electrical power?
- Watt.
  - Ampere.
  - Ohm.
  - Volt.

13. What is the formula for two or more unlike resistors in parallel?

a.  $R_T = E/R_1.$

b.  $R_T = R_1/N.$

c.  $R_T = \frac{R_1 \times R_2}{R_1 + R_2}.$

d.

$$R_T = \frac{1}{1/R_1 + 1/R_2 + \dots + 1/R_N}.$$

14. What current would flow through a 5,000- $\Omega$  resistor that is dissipating 50 W of power?

a. 100 mA.

b. 101 A.

c. 10 mA.

d. 100 A.

15. What is the formula for total current in a series circuit?

a.  $I_T = E_1/R_1 + E_2/R_2 + E_3/R_3.$

b.  $I_T = I_1 - I_2 - I_3.$

c.  $I_T = I_1 + I_2 + I_3.$

d.  $I_T = I_1 = I_2 = I_3.$

16. What is the symbol for alternating current?

a. DC.

b. Hz.

c. F.

d. AC.

17. How did alternating current get its name?

a. From the person who developed it.

b. From one of its characteristics.

c. From the constant current.

d. From the constant voltage.

18. Which of the following statements best describes the current characteristics of an AC system?

a. The electrons move through a circuit in one direction for a period of time, and then move back in the other direction for a like period of time.

b. The electrons move from a point of low potential to a point of high potential.

c. The voltage in an AC circuit never changes polarity.

d. The electrons move through a circuit in one direction for a period of time, and then move back in the other direction for a period of time twice as long.

19. Which of the following is another name for the magnetic lines of force?
- CEMF.
  - EMF.
  - Flux.
  - Conductor.
20. Which of the following is the machine in which the magnetic field is provided by an electromagnet?
- Permanent magnet.
  - Dynamo.
  - Magneto.
  - Armature.
21. What is the name of all values of the sinewave between  $0^\circ$  and  $180^\circ$  above the zero reference line?
- One cycle.
  - Positive alternation.
  - Negative alternation.
  - One revolution.
22. Which of the following letter symbols represents ultra high frequencies?
- H-F.
  - VHF.
  - SHF.
  - UHF.
23. What happens to the wavelength of an AC cycle if the frequency increases?
- Increases.
  - Decreases.
  - Remains the same.
  - Doubles.
24. What is the formula used to find the peak voltage of 100 volts effective?
- Peak voltage =  $.707 \times 100$  Veff.
  - Peak voltage =  $.9 \times 100$  Veff.
  - Peak voltage =  $1.414 \times 100$  Veff.
  - None of the above.

25. Which of the following is another name used when referring to the RMS (Root-Mean-Square) value?
- a. Peak value.
  - b. Effective value.
  - c. Peak-to-peak value.
  - d. Average value.
26. What is the effective value of 200 volts peak-to-peak?
- a. 70.7 Veff.
  - b. 141.4 Veff.
  - c. 14.14 Veff.
  - d. 707.0 Veff.
27. Which of the following statements best describes capacitance?
- a. The opposition the capacitor offers to voltage.
  - b. The capacitor's ability to store energy.
  - c. The opposition the capacitor offers to current.
  - d. The capacitor's ability to store resistance.
28. What factors determine the capacitance of a capacitor?
- a. Area of the plates and thickness of the dielectric.
  - b. Area of the plates and the length of the dielectric.
  - c. Distance between the plates only.
  - d. Type of dielectric used only.
29. What is the total capacitance of a circuit with three capacitors connected in series with the following values,  $C_1 = .015 \mu\text{fd}$ ,  $C_2 = .015 \mu\text{fd}$ , and  $C_3 = .015 \mu\text{fd}$ ?
- a. .5  $\mu\text{fd}$ .
  - b. .05  $\mu\text{fd}$ .
  - c. .015  $\mu\text{fd}$ .
  - d. .005  $\mu\text{fd}$ .
30. What is the total capacitance of a circuit containing a .01  $\mu\text{fd}$ , a .015  $\mu\text{fd}$ , and a .001  $\mu\text{fd}$  capacitor, all connected in parallel?
- a. .035  $\mu\text{fd}$ .
  - b. .06  $\mu\text{fd}$ .
  - c. .026  $\mu\text{fd}$ .
  - d. .0026  $\mu\text{fd}$ .

31. What is the capacitive reactance of a capacitor valued at .05  $\mu\text{fd}$  when a 5kHz signal is applied?
- 6363.1  $\Omega$ .
  - 636  $\Omega$ .
  - 122  $\Omega$ .
  - 235  $\Omega$ .
32. What is the phase relationship of the current and voltage across a capacitor?
- Current lags the voltage by  $90^\circ$ .
  - They are in phase.
  - Current leads the voltage by  $180^\circ$ .
  - Current leads the voltage by  $90^\circ$ .
33. What is the phase relationship of the current and voltage in a pure inductive circuit?
- The current leads voltage by  $90^\circ$ .
  - The current lags voltage by  $90^\circ$ .
  - The current leads voltage by  $45^\circ$ .
  - The current lags voltage by  $45^\circ$ .
34. What is the inductive reactance of a circuit containing an inductor valued at 15 mh, with a 10kHz signal applied?
- 942  $\Omega$ .
  - 9843  $\Omega$ .
  - 98  $\Omega$ .
  - 9042  $\Omega$ .
35. What is the inductance of a circuit containing two 10 mh inductors connected in parallel?
- 20 mh.
  - 10 mh.
  - 5 mh.
  - 15 mh.
36. What is the total inductance of a circuit containing three 5 mh inductors connected in series?
- 5 mh.
  - 15 mh.
  - 1.67 mh.
  - 10 mh.

37. What is the applied voltage to a resistive-capacitive circuit if the voltage drop across the resistor is 15 V and the voltage drop across the capacitor is 20 V?
- a. 10 V.
  - b. 15 V.
  - c. 20 V.
  - d. 25 V.
38. What is the total impedance of a circuit when the resistance is 15K  $\Omega$  and the capacitive reactance is 10K  $\Omega$ ?
- a. 18K  $\Omega$ .
  - b. 1.8K  $\Omega$ .
  - c. 180  $\Omega$ .
  - d. 180K  $\Omega$ .

**EXERCISE SOLUTIONS****LESSON 1**

1. b (see page 3) .
2. d (see page 2) .
3. c (see page 19) .
4. d (see page 1) .
5. c (see page 20) .
6. a (see page 19) .
7. b (see page 16) .
8. c (see page 14) .
9. b (see page 20) .
10. b (see page 14) .
11. d (see page 11) .
12. c (see page 10) .
13. d (see page 10) .
14. a (see page 10) .
15. c (see page 1) .
16. a (see page 19) .
17. d (see page 8) .
18. a (see page 2) .
19. d (see page 14) .
20. c (see page 19) .

**LESSON 2**

1. c (see page 29) .
2. d (see page 29) .
3. b (see page 29) .
4. d (see page 29) .
5. a (see page 37) .
6. c (see page 33) .
7. a (see page 37) .
8. c (see page 33) .
9. b (see page 33) .
10. c (see page 36) .
11. b (see page 34) .
12. c (see page 38) .
13. a (see page 39) .
14. c (see page 41) .
15. b (see page 41) .
16. b (see page 41) .
17. b (see page 41) .
18. d (See page 41) .
19. c (see page 41) .
20. a (see page 32) .



**LESSON 3**

1. b (see page 50) .
2. c (see page 52) .
3. d (see page 64) .
4. b (see page 59) .
5. c (see page 60) .
6. c (see page 61) .
7. d (see page 60) .
8. d (see page 59) .
9. b (see page 60) .
10. a (see page 59) .
11. d (see page 59) .
12. a (see page 63) .
13. c (see page 62) .
14. c (see page 66) .
15. d (see page 62) .
16. d (see page 61) .
17. c (see page 59) .
18. a (see page 53) .
19. d (see page 60) .
20. c (see page 59) .

**LESSON 4**

1. d (see page 72) .
2. c (see page 72) .
3. c (see page 72) .
4. a (see page 73) .
5. b (see page 73) .
6. c (see page 88) .
7. d (see page 91) .
8. b (see page 76) .
9. c (see page 76) .
10. a (see page 76) .
11. d (see page 76) .
12. a (see page 78) .
13. d (see page 79) .
14. b (see page 94) .
15. c (see page 80) .
16. d (see page 80) .
17. d (see page 82) .
18. d (see page 89) .
19. c (see page 96) .
20. b (see page 84) .