Chapter 7

1. Milliamperes is the unit used to measure:

a. electromotive force in a circuit

b. the total electrical power used during an exposure

c. the flow rate of electrons in a circuit

d. the amount of resistance in a circuit

e. the amount of radiation coming out of the x-ray tube.

2. Anything which converts mechanical energy into electrical energy is a(n):

a. rotor

b. stator

c. motor

d. generator

e. battery

3. In an AC circuit, the actual electrons:

a. flow in a straight-line path

b. do not move at all

c. vibrate back and forth

d. move at nearly the speed of light

4. A parallel circuit is one in which:

a. two or more devices are connected across different branches

b. a group of parallel resistors are connected to transformers

c. two or more devices are connected in sequence, or in a row

d. wires are parallel to each other such that they never connect

5. In an electrical circuit, electrons are supplied by:

a. a battery

b. a motor

c. a generator

d. the conductor (wire)

e. none of these

6. In electrical current, electrons always move rather than protons because by comparison,

electrons:

a. are loosely bound in the atom

b. have much less mass (are “lighter”)

c. are far from the nucleus

d. all of the above

e. none of the above

7. Electrical fields are always created inside:

a. tiny domains of metal atoms

b. diamagnetic materials

c. moving magnets

d. conductors in moving magnetic fields

e. none of these

8. A circuit is powered by a battery. The electrons flow:

a. out from the battery into the circuit

b. from the circuit into the battery

c. from the positive battery terminal to the negative terminal

d. through both the battery and the rest of the circuit

e. none of these

9. The *effect* of electrical charges in motion through a conductor is referred to as:

a. current

b. potential difference

c. voltage

d. charge

e. power

10. Which of the following will create the most electrical resistance?

a. a long wire with a small diameter

b. a short wire with a small diameter

c. a long wire with a large diameter

d. a short wire with a large diameter

11. In order for electrical current to flow, there must be:

a. a conducting path

b. a potential difference

c. a closed conducting path and a potential difference

d. a battery in the circuit

12. The direction of electrical current flow is traditionally defined by electricians as the:

a. direction of movement of positive charge

b. direction of movement of negative charge

c. direction of movement of actual electrons

d. direction of movement of any charged particle

e. none of these

13. In a common circuit, electrons actually move at speeds of:

a. about 2.5 cm per hour

b. about 2.5 cm per second

c. many meters per second

d. the speed of light

e. none of these

14. A flashlight holds two 1.5-volt batteries in series for a total EMF of 3 volts. The current

flowing when the flashlight is turned on is ½ (0.5) amp. How much electrical resistance is

being given by the flashlight’s bulb and wires?

a. 1.5 ohms

b. 0.75 ohms

c. 2 ohms

d. 3 ohms

e. 6 ohms

15. Which of the following is not a form of Ohm’s law?

a. R = V/I

b. I = VR

c. V = IR

d. I = V/R

16. Any device which operates on the principle of electromagnetic induction must be powered

by:

a. a magnet

b. alternating current

c. direct current

d. high voltage

e. a generator

17. The unit of measure for electrical power is the:

a. volt

b. watt

c. ampere

d. ohm

e. mAs

18. Michael Faraday discovered that a moving magnet will induce electricity to flow in a nearby

wire. This is the principle of:

a. electrodynamics

b. the motor

c. the generator

d. Coulomb’s law

e. the transformer

19. Ohm’s law states that the electrical current:

a. times the voltage equals the resistance

b. divided by the voltage equals the resistance

c. divided by the resistance equals the voltage

d. equals the voltage times the resistance

e. equals the voltage divided by the resistance

20. If a circuit contains 30 ohms of resistance with 60 volts applied, the current flowing will be:

a. 30 amps

b. .5 amps

c. 2 amps

d. 1800 amps

21. A 60-watt light bulb is turned on in your home with 120 volts of force supplied from the

plug. The light bulb must be using:

a. ½ amp of current

b. 2 amps of current

c. 7,200 amps of current

d. 2 ohms of resistance

e. ½ coulomb of current

22. In electrical circuits, one by-product of high resistance is:

a. sound

b. heat

c. magnetism

d. chemical oxidation

e. chemical reduction

23. For part of a circuit that has constant resistance, as voltage is increased:

a. current flow is decreased

b. current flow is increased

c. current flow is unchanged

d. power is decreased

e. impedance is decreased

24. Which of the following would *not* be classified as a dielectric?

a. rubber

b. plexiglass

c. plastic

d. wood

e. steel

25. In a common circuit, the *effect* of the electrical current travels at:

a. the speed of sound

b. about an inch per second

c. many meters per second

d. the speed of light

e. none of these

26. Electromotive force is measured in:

a. coulombs

b. watts

c. volts

d. ohms

27. Which of the following is *not* related to the force applied to an electrical charge?

a. voltage

b. potential difference

c. EMF

d. amperage

28. In a series circuit, what can *not* change throughout the circuit:

a. resistance

b. amperage

c. voltage

d. power

29. What is the main advantage of a parallel circuit?

a. the independence of the branches

b. the interdependence of the branches

c. amperage increases as branches are added

d. total resistance in the circuit drops

30. What is a device called that measures electrical current?

a. capacitor

b. ammeter

c. voltmeter

d. ground

e. wattage indicator

31. Which of the following occurs when the current in a wire increases?

a. the magnetic field strength increases

b. the magnetic field strength decreases

c. the magnetic field changes direction

d. resistance increases

e. resistance decreases

32. Maximum electromagnetic induction will occur when a conductor (wire) moves through a

magnetic field at what angle?

a. 0 degrees

b. 45 degrees

c. 90 degrees

d. 180 degrees

33. At 110 volts EMF, and a current of 5 amps, the electrical resistance must be:

a. 22 ohms

b. 55 ohms

c. 220 ohms

d. 550 ohms

34. Hans Oersted discovered that a magnet will be deflected by a nearby electrical current. This

is the principle of operation for the:

a. battery

b. circuit

c. generator

d. motor

e. x-ray tube

35. The greater the power rating of a device, the:

a. faster it does work

b. more work it can do

c. more efficiently it uses energy

d. less current is required

36. A 100-watt stereo sound system draws 5 amps of AC electrical current. What is its

impedance?

a. 0.05 ohms

b. 0.25 ohms

c. 4 ohms

d. 20 ohms

e. 500 ohms

37. In most of Europe, the electricity supplied is 50 Hertz AC. How many times does the current

stop and start in one second?

a. 2

b. 25

c. 50

d. 100

e. 120

38. An x-ray machine has a 30 kilowatt (kW) generator. If the maximum kilovoltage available is

150 kV, what will be the available tube current?

a. 2 A

b. 200 mA

c. 5 A

d. 500 mA

39. A fluoroscope is operated at 95 kVp and 2 mA. What is the power consumption at this

technique?

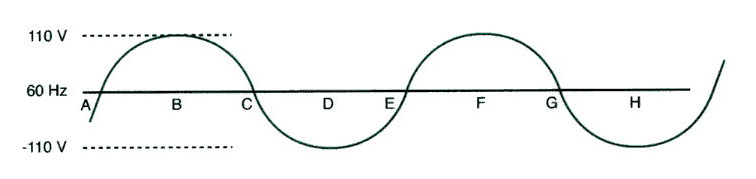
a. 47.5 W

b. 47.5 kW

c. 190 W

d. 190 kW

40-42 Use the diagram of AC electricity below:



40. In this diagram, what is the length of time between points A and C?

a. ½ second

b. 1/30 second

c. 1/60 second

d. 1/120 second

e. .110 second

41. In this diagram, how many *positive* pulses occur each second?

a. 15

b. 30

c. 60

d. 120

e. 110

42. In this diagram, when comparing segment A to B with segment B to C:

a. electrons are speeding up from A to B and slowing down from B to C

b. electromotive force is higher at A than at C

c. electrons are flowing in opposite directions

d. amperage is increasing from A to B and decreasing from B to C

43. In the secondary coil of a transformer, induced electrical current will always flow in the

opposite direction from the current supplied to the primary coil. This:

a. is known as Faraday’s law

b. is known as the third law of electrodynamics

c. is known as Lenz’s law

d. was discovered by Volta

44. The term *electromagnetic induction* refers to the production of:

a. electromagnetic radiation

b. a magnetic field

c. an electric current

d. magnets

e. electromagnets

45. In an induction motor:

a. only the rotor has windings

b. only the stator has windings

c. both the rotor and the stator may have windings

d. neither the rotor nor the stator has windings

46. In any transformer, the change in amperage is always the turns ratio of the

transformer:

a. proportional to

b. inversely proportional to

c. proportional to the square of

d. inversely proportional to the square of

47. Lenz’s law causes the rotor shaft of the x-ray tube to spin when an electrical current is

supplied to the stator (coil of wire) surrounding it because:

a. the negative charge of the stator pulls the positive charge of the rotor toward it

b. the north pole of the magnetic field around the rotor is repelled by the north pole of the

magnetic field around the stator

c. the north pole of the magnetic field around the rotor is attracted by the north pole of the

magnetic field around the stator

d. the negative charge of the stator pulls the negative charge of the rotor toward it

48. If one *milliamp* represents 6.3 X 1015 electrons, what is the total number of electrons used

for an x-ray exposure taken at 200 mA and 0.4 seconds:

a. 5.04 X 1017 electrons

b. 5.04 X 1020 electrons

c. 5.04 X 1014 electrons

d. 12.7 X 1015 electrons

49. The secondary coil of a transformer has 20,000 turns; the primary coil has 500 turns. If 120

volts is supplied to the primary coil, what will be the resulting voltage in the secondary

coil?

a. 40 volts

b. 3 volts

c. 4800 volts

d. 480 volts

50. For the transformer in #50 above, what is the turns ratio?

a. 200:5

b. 40:1

c. 1:40

d. 200:1

e. 1:200

51. For the transformer in #50 above, if 600 mA is fed into the primary coil, what is the

resulting secondary amperage*, in mA?*

a. 24,000 mA

b. 15 mA

c. 24 mA

d. 66.7 mA

e. 12,000 mA