Chapter 8

1. In the basic x-ray machine circuit, a device which is designed to protect the entire unit from

electrical overloads or short circuits is the:

a. line voltage compensator

b. rheostat

c. rectifier

d. circuit breaker

e. exposure switch

2. Which of the following controls on the control console corresponds in the x-ray machine

circuit with the autotransformer?

a. mode selection

b. mA stations

c. major and minor kVp

d. line voltage compensator

e. fluoro mA

3. In the basic x-ray machine circuit, which of the following is normally located between the

autotransformer and the step-up transformer?

a. exposure timer circuits

b. the rectifier bridge

c. the circuit breaker

d. a series of resistors

e. the mA meter

4. After passing through the step-up transformer, the electrical current waveform is:

a. rectified AC

b. unrectified AC

c. pulsed DC

d. continuous DC

5. In the x-ray machine circuit, which of the following turns ratios would be most typical for the

high-voltage transformer?

a. 1:44

b. 44:1

c. 1:1000

d. 1000:1

e. 400:1

6. Electricity can flow through a solid-state diode when a(n) is formed at the n-p junction:

a. rectification bridge

b. potential bridge

c. polarization

d. voltage waveform

e. amplified current

7. In a solid-state rectifying diode, when electrons try to pass through in the wrong direction:

a. holes in the *p*-type crystal drift toward the far end of the diode

b. holes in the *p*-type crystal drift toward the center of the diode

c. holes in the *n*-type crystal drift toward the center of the diode

d. electrons in the *n*-type crystal drift toward the center of the diode

e. electrons in the *p*-type crystal drift toward the far end of the diode

8. For the purpose of inducing thermionic emission, the current supplied to the x-ray tube

filament is:

a. low amperage, low voltage

b. high amperage, low voltage

c. low amperage, high voltage

d. high amperage, high voltage

9. The filament current is applied to the x-ray tube filament each time the:

a. x-ray machine is turned on

b. mA station is selected

c. exposure switch is depressed

d. rotor switch is depressed

10. The x-ray tube filament is made of an especially thin wire in order to increase:

a. voltage

b. amperage

c. current

d. friction

e. power

11. In the basic x-ray machine circuit, the last electronic device through which high-voltage

electricity must pass before reaching the x-ray tube is always the:

a. mA meter

b. step-up transformer

c. step-down transformer

d. autotransformer

e. rectifier bridge

12. What is the voltage waveform for the x-ray tube current passing from cathode to anode

during an exposure:

a. rectified AC

b. unrectified AC

c. continuous DC

d. unrectified DC

13. Which of the following are functions of the “rotor” switch before exposure can be made:

a. Spin the anode disc up to full speed rotation

b. Engage the oscillating grid for bucky procedures

c. Bring the x-ray tube filament up to full temperature for the mA station selected

d. All of the above

e. a and b only

14. What is the voltage waveform for the filament current passing through the filament during an

exposure:

a. rectified AC

b. unrectified AC

c. pulsed DC

d. continuous DC

15. Which of the following most likely describes the characteristics of the filament current:

a. 5 amps at 5 volts

b. 5 amps at 70,000 volts

c. 200 milliamps at 5 volts

d. 200 milliamps at 70,000 volts

16. Within the x-ray machine circuit, a meter placed in *series* in the secondary side of the high-

voltage transformer most likely measures:

a. watts

b. ohms

c. volts

d. milliamperes

e. amperes

17. For safety purposes, the kVp meter is usually:

a. pre-reading

b. placed in the filament circuit

c. placed in the circuit between the step-up transformer and the rectifier

d. placed in the circuit before the autotransformer

e. not placed in the control console

18. An x-ray machine with three rectifiers would best be described as:

a. self-rectified

b. half-rectified

c. fully-rectified single phase

d. fully-rectified three phase

19. The maximum number of pulses of electricity that can be produced by a single-phase x-ray

generator is per second:

a. 30

b. 60

c. 120

d. 360

e. 720

20. Which of the following x-ray generators generates an *average* kV that is about 91% of the set

kVp:

a. fully-rectified single-phase

b. three-phase 6-pulse

c. three-phase 12-pulse

d. high-frequency generator

e. constant potential generator (CPG)

21. Which of the following x-ray generators has a voltage *ripple* of about 14%:

a. fully-rectified single-phase

b. three-phase 6-pulse

c. three-phase 12-pulse

d. high-frequency generator

e. constant potential generator (CPG)

22. In comparing three-phase x-ray generators to single-phase generators, the three-phase

generators produce:

a. higher ripple effect

b. higher subject contrast in the remnant x-ray beam

c. higher effective mA

d. lower effective kV

e. higher kVp for a set kV

23. Which of the following x-ray generators produces an average kV at about 1/3 of the set kVp:

a. fully-rectified single-phase

b. three-phase 6-pulse

c. three-phase 12-pulse

d. high-frequency generator

e. constant potential generator (CPG)

24. Which of the following x-ray generators produces 720 pulses of electricity per second:

a. fully-rectified single-phase

b. three-phase 6-pulse

c. three-phase 12-pulse

d. high-frequency generator

e. constant potential generator (CPG)

25. Compared to single-phase generators, three-phase generators require only one-half of the:

a. rectifiers

b. set mAs

c. set kVp

d. voltage ripple

e. power supply

26. Compared to single-phase generators, the effect of three-phase and high-frequency

generators on the characteristics of the remnant x-ray beam is to slightly:

a. reduce subject contrast

b. reduce exposure rate

c. reduce total exposure`

d. reduce gray scale

e. reduce sharpness of detail

27. An x-ray generator producing electrical current at 500 hertz would be classified as:

a. fully-rectified single-phase

b. three-phase 6-pulse

c. three-phase 12-pulse

d. high-frequency generator

e. constant potential generator (CPG)

28. The formula, *0.7 X mA X kVp / 1000* gives us the:

a. power rating for a single-phase generator

b. power rating for a three-phase generator

c. power rating for a high-frequency generator

d. maximum allowable technique for a single-phase generator

e. maximum allowable technique for a three-phase generator

29. The appropriate electrical unit for the power rating of an x-ray generator is:

a. heat units (HU)

b. kilovolts (kV)

c. megavolts (MV)

d. joules (J)

e. kilowatts (kW)

30. Which of the following x-ray generators is most recommended for use on pediatric patients?

a. fully-rectified single-phase

b. three-phase 6-pulse

c. three-phase 12-pulse

d. high-frequency generator

31. Timers for manually setting radiographic exposure include all of the following *except:*

a. mAs timers

b. electronic timers

c. synchronous timers

d. pulse timers

32. The preferred type of radiation detector for automatic exposure controls (AECs) is the:

a. pocket dosimeter

b. gas ion chamber

c. scintillation counter

d. photomultiplier tube

e. proportional counter

33. When the correct level of exposure is reached, an automatic exposure control (AEC) circuit

breaks the main circuit of the x-ray machine. To open a switch in the main circuit, the

AEC uses a(n):

a. thyratron

b. capacitor

c. surge of electricity to an electromagnet

d. electrical current to a mechanical lever

34. In the simplest terms, the thryatron of an automatic exposure control (AEC) counts up

accumulating:

a. time

b. electrical charge

c. radiation

d. mA

e. exposure rate

35. When a patient is rolled up onto her side, it takes longer for the AEC to shut off the exposure

because:

a. remnant beam exposure rate is reduced

b. the remnant beam is less penetrating

c. the AEC clock runs longer

d. the total number of x-rays reaching the detectors throughout the exposure is reduced

e. the AEC is able to ascertain a measurement of the patient

36. In an automatic exposure control (AEC), adjusting the “density” control on the console

re-sets the:

a. ion chambers

b. capacitor

c. thyratron

d. electromagnet

e. clock

37. The “density” controls for most AECs adjusts the pre-set exposer level in increments of:

a. 5%

b. 10%

c 20%

d. 25%

e. 50%

38. Which of the following requires that the AEC sensitivity be re-set?

a. Changing to a different type of CR cassette

b. Changing to pediatric procedures only in a particular room

c. Making an across-the-board change to all kVp’s listed on a technique chart

d. Changing from tabletop to bucky for a particular procedure

e. Rolling the patient into a different position

39. Because some quantum mottle is beginning to appear on images from a particular

radiographic unit, it is desired to increase the amount of exposure reaching the AEC

detectors. This can be achieved by re-setting which of the following:

a. the kVp

b. the mA

c. the exposure time

d. the “density” control

e. the line voltage