Chapter 36

1. Which of the following represents a realistic, yet exemplary repeat rate for a radiographic

imaging department to strive for?

a. 1-2%

b. 3-5%

c. 8-10%

d. 12-13%

e. 20%

2. The use of repeat analysis in a radiographic imaging department provides pertinent direction

for:

a. inservice topics

b. management decisions

c. cost-efficiency data

d. all of these

e. none of these

3. The validity of technique charts and technique guidelines is directly dependent upon proper:

a. positioning skills

b. calibration of equipment

c. methods of image storage

d. clinical patient care

4. The advent of digital imaging has reduced the percentage of all repeated exposures due to

improper brightness or density (too light or too dark) from approximately to .

a. 10%; 5%

b. 20%; 10%

c. 50%; 15%

d. 60%; 10%

e. 80%; 4%

5. In medical imaging departments with a quality control program in place, the great majority of

repeated exposures is due to improper:

a. radiographic technique

b. processing of the image

c. positioning

d. motion or poor patient cooperation

6. For most modern radiographers, the pursuit of continuing professional education is a matter

of:

a. continuing certification

b. professionalism

c. improved patient care

d. all of these

e. none of these

7. A line-pair group template test performed monthly on a particular x-ray unit suddenly shows a

decrease in the number of line-pairs resolved. This is most likely an indication of:

a. a burned out x-ray tube filament

b. blooming of the space charge in the x-ray tube

c. an anode warped from heat overload

d. any of the above

e. none of the above

8. For a half-value layer test, the following exposures are measured by an ion chamber with

increasing amounts of aluminum absorber placed in the beam as indicated below; What is

the HVL for this x-ray beam?

*0 mm Al: 160 mGy*

*1 mm Al: 100 mGy*

*2 mm Al: 60 mGy*

*3 mm Al: 30 mGy*

a. 0.5 mm Al

b. 1.5 mm Al

c. 2.0 mm Al

d. 2.5 mm Al

e. 3.0 mm Al

9. The kVp of any x-ray beam should not deviate by more than percent from the read-out

from the kVp meter:

a. 1

b. 2

c. 3

d. 5

e. 8

10. An x-ray beam has a half-value layer of 2 mm Al. If 4 mm of aluminum filtration is added at

the collimator, the intensity of the beam will be reduced to:

a. 75%

b. 50%

c. 40%

d. 25%

e. 10%

11. The size of the projected light field must be within plus or minus of the actual size of

the x-ray beam:

a. 1% of the SID

b. 2% of the SID

c. 5% of the SID

d. 10% of the SID

12. A beam verticality check shows the central ray to be precisely vertical. The field alignment

test on the same unit shows one side of the beam to be accurate, but the opposite side to

be off by 1 inch (2.5 cm). Taken together, these data most likely indicate:

a. slippage of one shutter in the collimator

b. misalignment of the light field mirror in the collimator

c. stripped locks on the x-ray tube head

d. a crooked ceiling crane holding the x-ray tube head

13. Government regulations and scientific recommendations require that each mA station be

linear to the two adjacent stations (the one above and the one below it) to within

accuracy.

a. 2%

b. 5%

c. 10%

d. 20%

e. 50%

14. For a fluoroscopic unit, regulations state that neither the length nor the width of the x-ray

field shall exceed that of the visible area of the image receptor by more than:

a. 2 cm

b. 2%

c. 3% of the SID

d. 5% of the SID

15. By eliminating both peripheral and ambient lighting around any radiographic image

(electronic or hard copy), its apparent is enhanced:

a. contrast

b. sharpness

c. darkness

d. magnification

16. Which of the following equipment calibration checks should fall within plus or minus 5%:

*1. exposure timer*

*2. mA linearity*

*3. mAs reproducibility*

*4. focal spot accuracy*

*5. x-ray beam alignment*

a. 1 only

b. 1, 2 & 3 only

c. 1 & 3 only

d. 4 only

e. 2, 4 & 5 only

17. Between all the different radiographic rooms within an imaging department, the automatic

exposure controls should be linear to within plus or minus:

a. 5%

b. 10%

c. 15%

d. 20%

e. 25%

18. Which of the following QC tests for digital imaging can be reasonably performed *visually* by

a radiographer:

a. field uniformity

b. erasure thoroughness or “ghosting”

c. intrinsic (dark) noise

d. uneven spatial resolution

e. all of the above

19. A single CR phosphor plate is erased and then processed without exposing it to x-rays. This

describes an appropriate test for:

a. field uniformity

b. erasure thoroughness

c. lag or “ghosting”

d. intrinsic (dark) noise

20. For medical diagnosis, it is critical for every electronic image monitor within a(n) to be

set at precisely the same luminance and contrast:

a. hospital

b. imaging department

c. diagnostic workstation

d. display station

21. Which of the following most closely describes a radiographic viewing area with *class 2*

monitors, where windowing and special post-processing operations can be performed on

images and saved, but where diagnostic findings are not dictated:

a. video display terminal (VDT)

b. any node in the PACS network

c. a technologist workstation

d. a display station

e. a radiologist workstation

22. For light emitted isotropically in all directions from a source, one *candela* generates one

*lumen* of light intensity per .

a. meter

b. square meter

c. steradian

d. radius

e. sphere

23. Which of the following emits by far the brightest light:

a. a CRT (cathode ray tube) monitor

b. an LCD (liquid crystal diode) monitor

c. an LED (light emitting diode) monitor

d. a conventional “viewbox” illuminator

24. The device (provided by many manufacturers of display monitors) designed to directly

measure luminance, or the light intensity emitted from a display monitor, is the:

a. densitometer

b. photometer

c. lux inflector

d. SMPTE test device

e. the ammeter

25. For a fluoroscopic unit, which of the following must be accurate to within 2% of the SID:

a. Alignment of the primary x-ray beam central ray

b. Length of the exposure field

c. Width of the exposure field

d. Area of the exposure field

26. Which of the following describes *illuminance:*

a. the intensity of light from other sources *striking a surface*

b. the intensity of light per area passing through space

c. the total intensity of light emitted in all directions from a source

d. the brightness of a particular portion of a radiographic image

e. the process by which radiography students come to understand the material taught

27. Which of the following units is best applied to a count of the number of light photons from a

computer screen passing through one square centimeter at a distance of 12 inches from

the screen, on their way to the human eye:

a. candela

b. lumens

c. lux

d. watts

e. roentgen

28. At 25 lux, the maximum ambient lighting in a radiologist’s reading room while images are

being diagnosed should be less than of the typical lighting for offices in general:

a. 3/4

b. ½

c. 1/4

d. 1/10

29. Compared to the cathode ray tube (CRT), the liquid crystal diode (LCD) has a very *poor:*

a. luminance response

b. luminance uniformity

c. luminance ratio

d. spatial resolution

e. diffuse reflectance

30. On the SMPTE test pattern and other test patterns for electronic image display monitors,

there are sets of adjacent squares with “just noticeable differences” (JNDs) in density

between them. This type of pattern is designed to test:

a. luminance response

b. luminance ratio

c. maximum luminance

d. gray scale

e. spatial resolution

31. The reflection of a light bulb that is behind the observer, from the surface of a display

monitor is classified as:

a. ambient lighting

b. inherent image noise

c. false images

d. specular reflectance

e. diffuse reflectance

32. For electronic image display monitors, test patterns consisting of circles or squares of

progressing just noticeable differences (JNDs) of density from a black background mask

can be used not only for testing contrast, but also for testing:

a. noise

b. maximum luminance

c. luminance ratio

d. resolution

e. distortion

33. On the SMPTE pattern or other test patterns for electronic display monitors, two series of

narrow horizontal bars, one with high contrast alternating black and white and the other

with low contrast alternating dark gray and light gray, are designed to measure:

a. horizontal resolution

b. vertical resolution

c. contrast resolution

d. bandwidth

e. luminance ratio

34. The minimum acceptable resolution for electronically displayed images, recommended by

physicist and radiological associations, is:

a. 2.5 LP/mm

b. 4 LP/mm

c. 6 LP/mm

d. 8 LP/mm

e. 10 LP/mm

35. On a liquid crystal diode (LCD) monitor, a *dead* pixel is seen as:

a. a black spot against a white background, the size of a period in 12-point font

b. a white spot against a black background, the size of a period in 12-point font

c. a black spot against a white background, 1/18th the size of a period in 12-point font

d. a white spot against a black background, 1/18th the size of a period in 12-point font

36. A class 1 LCD, used for diagnosis, must have or fewer bad pixels across the entire area

of the monitor screen:

a. 3

b. 8

c. 15

d. 25

e. 30

37. More expensive liquid crystal diode (LCD) monitors may have angled pixel segments in

order to reduce:

a. veiling glare

b. specular reflectance

c. diffuse reflectance

d. noise

e. viewing angle dependence