# *Radiographic Image Analysis 5th edition Martensen Test Bank*

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**MULTIPLE CHOICE**

1. The light collected and converted to an electrical signal by the photomultiplier tube (PMT) during CR image sampling is then sent to the _____ to be digitized.
   a. ADC (analog-to-digital converter)
   b. DAC (digital-to-analog converter)
   c. LUT (lookup table)
   d. workstation

   ANS: A

2. What is the location on a histogram graph of air/gas?
   a. Center
   b. Far right
   c. Left
   d. Right

   ANS: D

3. What is the location on a histogram graph of background brightness?
   a. Center
   b. Far right
   c. Left
   d. Right

   ANS: B

4. What is the location on a histogram graph of bone?
   a. Center
   b. Far right
   c. Left
   d. Right

   ANS: C

5. What is the location on a histogram graph of contrast/metal?
   a. Center
   b. Far right
   c. Far left
   d. Right

   ANS: C

6. What is the location on a histogram graph of fat?
   a. Center
   b. Far right
   c. Left
   d. Right

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ANS: D

7. What is the location on a histogram graph of soft tissue?
   a. Center
   b. Far right
   c. Left
   d. Right

   ANS: A

8. All of the following may result in histogram analysis errors *except*
   a. unusual pathologic conditions.
   b. poor positioning.
   c. motion.
   d. alignment of the anatomic part with the IR.

   ANS: C

9. All of the following are guidelines for producing optimal image histograms *except*
   a. choose the correct body part and projection from the workstation menu.
   b. leave minimal background in the exposure field through tight collimation.
   c. use the smallest possible IR and cover at least 50% of it.
   d. erase the imaging plate if the IR has not been used for a few days.

   ANS: C

10. The exposure indicator number represents all of the following *except* the
    a. amount of light given off by the imaging plate.
    b. amount of exposure to the patient.
    c. amount of exposure to the imaging plate.
    d. measure of dose to the patient.

    ANS: D

11. At what level is the exposure indicator reading taken on the VOI?
    a. At S1
    b. At S2
    c. One fourth of the distance between S1 and S2
    d. Halfway between S1 and S2

    ANS: D

12. When is the examination or body part selected when using the DR system?
    a. After the radiation exposure
    b. Before the radiation exposure
    c. At any time during the radiation exposure
    d. This is not a required procedure.

    ANS: B

13. Which of the following CR cassette sizes will provide the greatest recorded detail?
    a. 8 × 10 inch

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b. 10 × 12 inch
c. 14 × 17 inch
d. All sizes would have equal recorded detail.

ANS: A

14. How many shades of gray can each pixel in a digital matrix display?
a. One
b. Two
c. Five
d. Ten

ANS: A

15. Which of the following is not part of the electronic components located in the DEL?
a. Capacitor
b. Conductor
c. Matrix
d. TFT

ANS: C

16. All of the following are true about quantum noise *except*
a. quantum noise results in excessive patient dose when present on the image.
b. quantum noise is demonstrated as a blotchy appearance on the image.
c. when present, quantum noise requires an increase in exposure factors to reduce its visualization on the image.
d. quantum noise is visualized when the exposure indicator number is higher than the ideal exposure values.

ANS: D

17. All of the following are true about histogram analysis errors *except*
a. histogram analysis errors result in erroneous exposure indicator numbers.
b. histogram analysis errors may occur as a result of poor central ray centering.
c. fog values outside the exposure field, but included in the VOI, do not cause widening of the histogram.
d. selecting the wrong body part or projection in the workstation menu will cause a histogram analysis error.

ANS: C

18. All of the following are true about windowing *except*
a. windowing occurs after the image is displayed on the monitor.
b. window level adjustments change the contrast of the image.
c. saving adjusted windowing settings to the PACS system narrows the dynamic range for future viewers.
d. windowing is referred to as a post-processing manipulation procedure.

ANS: B

19. An exposure recognition field algorithm is applied to the image data to

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1. distinguish the gray shade values inside the exposure field from those on the outside.
2. ensure the histogram has the correct shape.
3. identify the volume of interest before rescaling.
4. identify the volume of interest after rescaling.
5. reshape the histogram.

a. 1, 2, and 4 only
b. 2 and 3 only
c. 1, 2, and 3 only
d. 1, 3, and 5 only

ANS: C

20. Saturation indicates
a. underexposure of the IR.
b. overexposure of the IR.
c. quantum mottle.
d. histogram analysis error.

ANS: B

21. If the image histogram is wider than the LUT's histogram, all of the following are true *except* the algorithm would
a. narrow the histogram.
b. increase the degree of difference between the gray shades.
c. increase contrast.
d. widen the histogram.

ANS: D

22. Examples of artifacts that must be accepted include all of the following *except*
1. pacemakers.
2. dental bridges.
3. pleural drainage tubes secured with safety pins.
4. endotracheal tubes.
5. heart monitoring lines.

a. 1, 2, and 4 only
b. 3 and 5 only
c. 1 and 4 only
d. 2 and 3 only

ANS: B

23. Appropriate scatter radiation control methods include which of the following?
1. Tight collimation
2. Lead masking at the edge of the exposure field
3. Appropriate use of a grid
4. Lower kV settings
5. Using an air gap method

a. 1, 2, and 4 only
b. 2, 3, and 5 only
c. 1, 2, 3, and 5 only

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d. 1, 2, 3, 4, and 5

ANS: C

24. Histogram analysis errors for digital systems include all of the following *except*
    a. off-centered CR.
    b. wrong part selection from the workstation menu.
    c. collimation within 0.5 inch (2.5 cm) of the skin line.
    d. exposure of less than 30% of the IR.

    ANS: D

25. To demonstrate long bones with the least amount of distortion and obtain optimal anatomical alignment,
    1. align the CR perpendicular to the IR and the long axis of the bone.
    2. align the IR parallel to long axis of the bone.
    3. use the law of isometry when the long bone is parallel to the IR.
    4. use the law of isometry to minimize foreshortening.
    a. 1 and 2 only
    b. 2 only
    c. 1, 2, and 4 only
    d. 2 and 4 only

    ANS: C

26. When an image resembles a double exposure, the type of artifact demonstrated is a(n) _____ artifact.
    a. aliasing
    b. grid cutoff
    c. phantom image
    d. background fog

    ANS: C

27. All of the following statements are true *except*
    1. the movement of an image histogram, left to right, will adjust image brightness.
    2. the movement of an image histogram, left to right, will adjust the gray scale.
    3. changing the shape of the histogram will affect image contrast.
    4. changing the shape of the histogram will change the subject contrast.
    a. 2 only
    b. 1 and 3 only
    c. 3 only
    d. 2 and 4 only

    ANS: B

28. In a cassette-less imaging system,
    1. the correct examination is chosen before the exposure.
    2. thin-film transistors collect the electrical charge created in the LUT.
    3. thin-film transistors contain detector elements.
    a. 1 only
    b. 2 and 3 only

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c. 1 and 2 only
d. 1, 2, and 3

ANS: A

29. If a projection does not differentiate the densest and thickest structures in the VOI, adjusting the _____ is necessitated.
a. kVp
b. kVp and mAs
c. histogram
d. mAs and collimation

ANS: A

30. Exposure indicators
1. are used to create the histogram.
2. denote the quantity of photons that strike the IR.
3. are used to determine dose to the patient.
4. are displayed on the digital image.
a. 1 only
b. 1 and 2 only
c. 2 and 4 only
d. 1, 2, and 4 only

ANS: C

31. The anode heel affect
1. should be considered when the structure of interest is more than 43 inches long.
2. is a variation in photon intensity across the exposure field.
3. occurs because the heel of the anode absorbs more photons than the toe.
4. is best used with the thinner body toward the cathode.
a. 1 only
b. 2 and 3 only
c. 1, 2, and 4 only
d. 1, 2, 3, and 4

ANS: B

32. Technical considerations for abdominal imaging of obese patients include all of the following *except*
1. increasing kV will increase the penetrability of the photons.
2. increasing kV will increase the amount of scatter radiation directed toward the IR.
3. mAs should be doubled for every 2 cm of added tissue.
4. kV should be increased by 2 for every 2 cm of added tissue.
a. 1 and 2 only
b. 1, 2, and 4 only
c. 3 and 4 only
d. 2, 3, and 4 only

ANS: A

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33. The amount of light produced in each pixel in the matrix is _____ to the amount of energy that was _____ in that area of the IP during the acquisition process.
    a. equivalent; created
    b. inversely related; stored
    c. inversely related; created
    d. equivalent; stored

    ANS: D

34. Best practice guidelines for the use of automatic exposure control include all of the following *except*
    1. set the optimum kV for the body part.
    2. set the backup timer to 150% to 200% of the expected manual exposure.
    3. set the highest mA station for the focal spot size needed.
    4. wide collimation will ensure IR coverage.
    a. 1, 2, and 4 only
    b. 2 and 3 only
    c. 1, 2, and 3 only
    d. 4 only

    ANS: D

35. Underexposed projections that require repeating are identified by all of the following *except*
    1. quantum noise is present.
    2. the VOI demonstrates a loss of contrast resolution.
    3. the EI number is within the acceptable exposure range and no histogram error has occurred.
    4. the overall image is gray.
    a. 1 and 4 only
    b. 2 and 3 only
    c. 3 only
    d. 1 only

    ANS: C

36. Additive disease processes that would require at least a 35% increase in mA include all of the following *except*
    a. Paget's disease.
    b. pleural effusion.
    c. ascites.
    d. pneumonia.

    ANS: A

37. Quantum noise can affect edge discrimination and contrast resolution. The only way to decrease quantum noise is to increase the IR exposure by
    1. increasing kV.
    2. increasing mAs.
    3. decreasing kV.
    4. decreasing mAs.
    a. 1 and 2 only
    b. 2 and 3 only

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c. 3 and 4 only
d. 1 and 4 only

ANS: A

38. Technologists can assist the exposure field recognition process when making multiple exposures on one IR by
1. masking the unused portion of the IR with lead sheets.
2. ensuring the body part is centered within each exposure field.
3. increasing the distance between exposure fields.
4. maintaining equidistance and keeping collimation parallel with the edge of the IR.
a. 1, 2, and 3 only
b. 1, 2, and 4 only
c. 3 and 4 only
d. 1, 2, 3, and 4

ANS: D

39. In what order should the following tasks be performed during a trauma examination?
1. Obtain required projections.
2. Return the patient.
3. Disinfect the equipment, IRs, and positioning devices.
4. Determine the projections that will be needed.
5. Gather and organize the equipment, IR, positioning devices, and other supplies.
6. Process and evaluate the projections.
7. Determine patient mobility, alertness, and ability to follow requests.
a. 4, 5, 7, 1, 6, 3, 2
b. 7, 5, 4, 1, 6, 3, 2
c. 4, 5, 7, 1, 6, 2, 3
d. 5, 4, 7, 1, 2, 3, 6
e. 7, 5, 4, 1, 2, 6, 3

ANS: C

40. Which of the following patient conditions demonstrates high subject contrast?
a. Fluid retention caused by disease
b. High fat content
c. Pneumothorax
d. Dense bones

ANS: D

41. Which of the following patient conditions demonstrates low subject contrast?
a. Well-developed muscle structure
b. High fat content
c. Cardiomegaly
d. Hydrocephalus

ANS: B

42. Which of the following patient conditions demonstrates high subject contrast?
a. Dense bones

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b. Rheumatoid arthritis
c. Gout
d. High fat content

ANS: A

43. Which of the following patient conditions demonstrates low subject contrast?
a. Well-developed muscle structure
b. Fluid retention caused by disease
c. Osteoarthritis
d. Dense bone

ANS: B

44. Which of the following patient conditions demonstrates low subject contrast?
a. Low fat content
b. Dense bone
c. Obesity
d. Paget's disease

ANS: C

45. The patient's knee is unable to extend fully for an AP lower leg projection, causing the lower leg to be at a 20-degree angle with the IR. The projection should be obtained with a _____-degree central ray angle and _____-degree lower leg to IR angle.
a. 0; 20
b. 10; 10
c. 20; 20
d. 10; 20

ANS: B

46. Which technical factor listed below is primarily used to regulate density?
a. kVp
b. mAs
c. Grids
d. Distances (SID, OID)

ANS: B

47. Which of the following technical factors is primarily used to regulate subject contrast?
a. kVp
b. mAs
c. Grids
d. Distances (SID, OID)

ANS: A

48. What percentage of kVp adjustment doubles the density on an image?
a. 5%
b. 15%
c. 30%
d. 100%

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ANS: B

49. An AP abdomen projection was obtained using 85 kVp at 10 mAs. The resulting image demonstrated excessively low contrast, although the density was acceptable. What new technique could be used to obtain the projection with equal density but higher contrast?
    a. 72 kVp at 10 mAs
    b. 72 kVp at 20 mAs
    c. 81 kVp at 13 mAs
    d. 98 kVp at 5 mAs

    ANS: B

50. A patient stepped on a needle left in the carpet. Because only half the needle has been located and the patient has pain in the foot where the needle penetrated, it is suspected that the other half of the needle is still in the patient's foot. If the average technique for a lateral foot projection is 60 kVp at 75 mAs, what new technique should be used for this situation?
    a. 51 kVp at 37 mAs
    b. 51 kVp at 75 mAs
    c. 55 kVp at 75 mAs
    d. 60 kVp at 75 mAs

    ANS: B

51. What is the technical adjustment required with the patient condition of emphysema?
    a. +5 kVp
    b. +50% to 60% mAs
    c. –8 kVp
    d. +35% mAs

    ANS: C

52. What is the technical adjustment required with the trauma device of a small to medium plaster cast?
    a. +5 kVp or +25% to 30%
    b. +5 to 7 kVp or +50% to 60% mAs
    c. –15 to 20 kVp
    d. +50% mAs

    ANS: B

53. What is the technical adjustment required with the trauma device of a wood backboard?
    a. +5 kVp or +25% to 30%
    b. +5 to 7 kVp or +50% to 60% mAs
    c. –15 to 20 kVp
    d. +50% mAs

    ANS: A

54. What is the technical adjustment required with the patient condition of ascites?
    a. +25% to 30% mAs
    b. +5 to 7 kVp
    c. –15 to 20 kVp

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d. +50% mAs

ANS: D

55. What is the technical adjustment required with the patient condition of pleural effusion?
a. +15 kVp
b. +5 to 7 kVp
c. +35% mAs
d. +50% mAs

ANS: C

56. What is the technical adjustment required with the postmortem image of the head, thorax, and abdomen?
a. +5 kVp
b. +50% to 60% mAs
c. –15 to 20 kVp
d. +35% to 50% mAs

ANS: D

57. What is the technical adjustment required with soft tissue demonstration of foreign object?
a. +25% to 30% mAs
b. +5 to 7 kVp
c. –15 to 20 kVp
d. +50% mAs

ANS: C

58. What is the technical adjustment required with the patient condition of osteoporosis?
a. +5 kVp
b. +50% to 60% mAs
c. –8 kVp
d. +50% mAs

ANS: C

59. A PA chest projection was obtained using a grid with a recommended 40-inch focal range with a 72-inch SID. Where would the grid cutoff be demonstrated on the projection?
a. Peripherally
b. Across the entire image but more noticeable on one side
c. Evenly across the entire image
d. On one side only

ANS: A

60. What is the grid cutoff that occurs if the central ray is angled toward the grid's lead strips on a focused grid?
a. On both sides of the image
b. Across the entire image, but more noticeable on one side
c. Evenly across the entire image
d. On one side only

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ANS: B

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