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## **POST TEST**

For  
Continuing Education Home Study Course:

# **PART 2: Digital Radiography an Introduction**

(Covers Chapters 4 - 7)

## **5.0 Category A Continuing Education Credits**

This course has been reviewed and approved by the  
American Society of Radiologic Technologists (ASRT) and is accepted by ARRT.  
It has been assigned 5.0 Category A Continuing Education Credit Hours.

### **COURSE OBJECTIVE:**

The objective of this course is provide a comprehensive guide to all the major issues relating to digital imaging at a practical level.

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**COURSE TITLE: PART 2: Digital Radiography an Introduction**

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**Course #: R077-2**

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**TEST PART 2: DIGITAL RADIOGRAPHY an Introduction** (Chapters 4 to 7 – 60 Questions)

1. Since a very low contrast initial image is provided by imaging plates due to their large dynamic range, what is applied to the raw digital data to render an acceptable appearance?
  - a. a matrix
  - b. additional light exposure
  - c. processing algorithms
  - d. sharp mask
2. In digital systems, the speed class at which the system is operated is determined by the \_\_\_\_\_.
  - a. computer speed
  - b. projection angle
  - c. receptor exposure
  - d. network configuration
3. For a computed radiography image, evaluation of receptor exposure accuracy is accomplished through use of \_\_\_\_\_.
  - a. software
  - b. an algorithm
  - c. an exposure indicator
  - d. image sampling
4. Regardless of the equipment vendor, when is the exposure indicator determined?
  - a. during histogram analysis
  - b. before image acquisition
  - c. after histogram analysis
  - d. before data extraction
5. Which of the following is NOT one of the three significant factors which contribute to high image clarity and visualization of desired anatomical structures?
  - a. shielding of part
  - b. correct positioning of part
  - c. precise alignment of part, beam and receptor
  - d. selection of technical exposure factors
6. Grid cutoff is one problem associated with grid selection for a bedside radiograph, while the second associated problem is \_\_\_\_\_.
  - a. Moiré artifacts
  - b. motion artifacts
  - c. cross-excitation artifacts
  - d. grid artifacts
7. Why is the grid frequency important when choosing the appropriate grid to use with computed radiography?
  - a. the image is scanned quickly
  - b. the image is scanned line by line
  - c. it provides less accuracy in locating structures of interest
  - d. all of the above
8. For the available grid one should utilize the highest kVp (peak kilovoltage) practical, but a kVp higher than 130 should be avoided because the image would \_\_\_\_\_.
  - a. suffer poor edge enhancement
  - b. likely exhibit extremely low resolution
  - c. likely become noisy
  - d. likely contain corrupted data

9. For ANY nongrid radiography, including the chest, the kVp should NOT be higher than \_\_\_\_\_ because of the increased sensitivity to scattered radiation.
- 25
  - 35
  - 55
  - 80
10. For ALL digital detectors, the optimal alignment is to have beam and part centered to the receptor, with \_\_\_\_\_ collimation margins parallel to the cassette edges.
- 5
  - 2
  - 3
  - 4
11. It is recommended by MOST vendors that acquisition of extremities occur \_\_\_\_\_.
- two images per plate
  - two plates per image
  - one image per plate
  - none of the above
12. When the amount of intrafield scatter is low, what distribution should be used for toes and fingers?
- 1-on-3
  - 3-on-1
  - 1-on-5
  - 5-on-1
13. Application of \_\_\_\_\_ before printing or transmission to a PACS is a proper response to scatter and off-focus exposure outside the collimation margin.
- a black border to the image
  - a filter
  - a grid
  - a white border to the image
14. Personnel should use appropriate exposure levels PRIMARILY to avoid \_\_\_\_\_ and \_\_\_\_\_.
- saturation / ALARA violations
  - patient over exposure / Moiré artifacts
  - under exposure / Moiré artifacts
  - lack of detail / histogram analysis errors
15. Recorded detail is NOT determined by which of the following factors?
- geometric factors
  - rescaling factors
  - motion factors
  - spatial resolution of the receptor unit
16. With recorded detail in DIGITAL radiographic systems, a technologist should remember that spatial resolution is related to \_\_\_\_\_.
- saturation
  - pixel hypothecation
  - the pixel pitch
  - bit depth
17. GENERALLY, the response of plates, or their “speed,” is a function of their size – smaller plates are slower than larger plates.
- True
  - False

18. Which of the following is NOT a limitation of computed radiography when compared with film-screen radiography?
- spatial resolution in computed radiography is less than with film-screen radiography
  - computed radiography x-ray detection efficiency is less than film-screen radiography
  - computed radiography image plates are easily damaged
  - computed radiography procedure time is much longer than film-screen radiography
19. In a flat-panel digital radiography imaging system, what does the host computer do?
- it plays a significant role in controlling X-ray production
  - it acts as an interface between the flat-panel detector and the X-ray machine
  - it applies the appropriate image processing
  - all of the above
20. What type of X-ray absorber is used by a DIRECT flat panel digital radiography detector?
- phosphor
  - lead
  - photoconductor
  - photodiode
21. A(n) \_\_\_\_\_ conversion by a charge-coupled device (CCD) chip occurs with CCD digital detectors.
- electrical charge to light
  - light to electrical charge
  - magnetic charge to electrical charge
  - chemical to electrical charge
22. Which of the following BEST describes pixel pitch?
- the distance from the midpoint of one pixel to the midpoint of the adjacent pixel
  - the distance from the uppermost pixel to the lowest pixel
  - the distance from the top of one pixel to the bottom of the adjacent pixel
  - the angle of the pixel
23. In examining the fill factor of the pixel, which of the following is NOT one of the three components typically contained in a pixel?
- the vertex
  - the capacitor
  - the sensing area
  - the thin film transistor
24. The fill factor is MOST accurately expressed by which equation?
- $Fill\ Factor = \frac{Pixel\ area}{Pixel\ sensing\ area}$
  - $Fill\ Factor = \frac{Pixel\ sensing\ area}{Pixel\ area}$
  - $Fill\ Factor = \sqrt{Pixel\ area} \times Pixel\ sensing\ area$
  - $Fill\ Factor = Pixel\ sensing\ area^2 + Pixel\ area$
25. Indirect flat-panel thin film transistors initially convert X-ray photons into \_\_\_\_\_ through use of a scintillator layer like CsI (Cesium Iodide).
- electrons
  - protons
  - light photons
  - neutrons
26. The preparation of a flat-panel detector BEFORE its use in an X-ray exam is known as \_\_\_\_\_.
- startup assessment

- b. synching
  - c. preliminary data acquisition
  - d. initialization
27. Which of the following BEST describes what type of images are created by radiography?
- a. dynamic
  - b. multi-layered
  - c. static
  - d. proprietary
28. Where is the exposure indicator commonly shown?
- a. on the network monitor
  - b. on the digital image
  - c. on the table
  - d. on the equipment display
29. \_\_\_\_\_ can affect the exposure indicator value.
- a. Patient positioning
  - b. Collimation
  - c. Image processing
  - d. All of the above
30. In computed radiography, what is corrected by pre-processing techniques?
- a. raw data
  - b. the appearance of the image displayed on a monitor
  - c. projection angle used to acquire the image
  - d. patient dose
31. In digital imaging systems, the \_\_\_\_\_ determine(s) spatial resolution.
- a. size of the pixels in the matrix
  - b. number of pixels in the matrix
  - c. shape of pixels in the matrix
  - d. edge of pixels in the matrix
32. Digital detector response to various levels of radiation exposure is its \_\_\_\_\_.
- a. static range
  - b. dynamic range
  - c. curve response
  - d. imaging profile
33. If a digital detector was PERFECT it would have what detective quantum efficiency (DQE)?
- a. 0
  - b. 1
  - c. 2
  - d. 10
34. Thomas Edison developed the first fluoroscope in what year?
- a. 1880
  - b. 1895
  - c. 1896
  - d. 1912
35. What has replaced the television camera tube in modern fluoroscopic systems which utilizes image intensifiers?
- a. transducer technology
  - b. image distributor
  - c. digital camera
  - d. charge-coupled device

36. The input screen of the image intensifier in fluoroscopy is coated with which state-of-the-art phosphor?
- zinc-cadmium sulfide (ZnCdS)
  - indium borate ( $\text{InBO}_3\text{:Tb}$ )
  - zinc oxide ( $\text{ZnO:Zn}$ )
  - cesium iodide (CsI)
37. \_\_\_\_\_ to assist diagnostic interpretation is the purpose of magnification fluoroscopy.
- Pixel magnification
  - Bit depth enhancement
  - Image enhancement
  - None of the above
38. When an image loses brightness at its periphery it is known as \_\_\_\_\_.
- image lag
  - vignetting
  - pincushion distortion
  - veiling edge
39. In fluoroscopy radiologists may DIRECTLY observe the image at the output screen of the image intensifier tube.
- True
  - False
40. How is each line read in progressive scanning?
- sequentially
  - interlaced
  - randomly
  - in descending order
41. What does a digital fluoroscopy imaging system have at its core?
- a host computer
  - an analog-to-digital converter
  - a wifi connection
  - an image intensifier
42. In a digital fluoroscopy imaging system, the data supplied by the analog-to-digital converter to the computer is operated on a(n) \_\_\_\_\_ format.
- analog
  - matrix
  - archival
  - hierarchical
43. Which of the following is NOT a component of digital fluoroscopy systems using flat-panel detectors, known as DYNAMIC FPDs?
- x-ray tube
  - dynamic flat-panel detector
  - image sequencer
  - grid
44. GENERALLY, which of the following BEST describes the relationship between detector size and matrix size?
- a larger detector will have a larger matrix size
  - a smaller detector will have a larger matrix size
  - a larger detector will have a smaller matrix size
  - none of the above
45. In a flat-panel detector system, what shape is the image display?
- circular
  - triangular



- c. square
  - d. rectangular
46. In grayscale-image manipulation the window level changes \_\_\_\_\_.
- a. image contrast
  - b. image color
  - c. image brightness
  - d. image size
47. The image-processing technique known as last-image hold has what effect for the patient?
- a. It increases the time the patient has to stay in the same position
  - b. it reduces the radiation dose to the patient
  - c. it increases the radiation dose to the patient
  - d. it reduces the time the patient has to stay in the same position
48. The method of digital subtraction angiography, also known as temporal subtraction, uses subtraction of images \_\_\_\_\_.
- a. in time
  - b. in different angles
  - c. taken at different kVp
  - d. all of the above
49. Which of the following is NOT a limitation of screen-film mammography?
- a. high spatial resolution
  - b. limited dynamic range
  - c. film display characteristics are fixed once the film is developed
  - d. the film serves three roles – acquisition, display and storage
50. Which of the following is an advantage that digital mammography has over screen-film mammography?
- a. greater contrast resolution
  - b. wider dynamic range
  - c. computer-aided detection and diagnosis
  - d. all of the above
51. The FIRST action in creating a digital mammography image is \_\_\_\_\_.
- a. analog-to-digital conversion
  - b. digital image processing
  - c. image display
  - d. data acquisition
52. The ambient light in rooms where digital mammography computer display monitors are located should be \_\_\_\_\_.
- a. greater than 20 lux<sup>2</sup>
  - b. greater than 10 lux<sup>2</sup>
  - c. less than 10 lux<sup>2</sup>
  - d. less than 5 lux<sup>2</sup>
53. The acronym PACS refers to which of the following?
- a. picture archiving and communication system
  - b. practical application and communications system
  - c. picture acquisition and creation system
  - d. picture acquisition and collaboration software
54. How many MAJOR components comprise the detector in a flat-panel scintillator/amorphous silicon (a-Si) digital mammography system?
- a. one
  - b. two
  - c. three

- d. five
55. In a charge-coupled device (CCD) digital mammography system, what couples the cesium iodide (CsI) phosphor to the CCD array?
- a. a cathode
  - b. vacuum tube system
  - c. fiberoptical system
  - d. the imaging plate
56. In an ORDINARY computed radiography digital mammography system, what is the last step?
- a. the imaging plate is exposed to X-rays
  - b. imaging plate is transported to a computed radiography reader to be scanned
  - c. the imaging plate is exposed to a high intensity light
  - d. the image on the imaging plate is digitally corrected by the technologist
57. An example of a GLOBAL operation in digital image post-processing specific to digital mammography is which of the following?
- a. image subtraction
  - b. smoothing
  - c. the Fourier transform
  - d. temporal averaging
58. What is the negative aspect of the specific image-processing algorithm for digital mammography known as Trex processing?
- a. It reduces image detail
  - b. It reduces image size
  - c. It reduces pixel edge detail
  - d. It reduces image contrast
59. In computer-aided detection and diagnosis (CAD), lesions are distinguished from ordinary anatomical structures during \_\_\_\_\_.
- a. image processing
  - b. data processing
  - c. quantification
  - d. image acquisition
60. For breast tomosynthesis, in both step-and-shoot and continuous exposure methods of data acquisition, the X-ray tube \_\_\_\_\_.
- a. remains stationary during the exposure
  - b. travels in full circles during the exposure
  - c. travels in an arc during the exposure
  - d. travels in a vertical pattern to the patient