

Chapter 02: Digital Imaging Characteristics

Carter: Digital Radiography and PACS, 3rd Edition

MULTIPLE CHOICE

1. Multiple numeric values divided into an array of small elements capable of being processed is the definition of _____ images.
- analog
 - digital
 - medical
 - radiographic

ANS: B OBJ: Differentiate between analog and digital images.

2. The continuous and varying levels of brightness and colors describe _____ images.
- analog
 - digital
 - medical
 - radiographic

ANS: B OBJ: Differentiate between analog and digital images.

3. Critical characteristics of a digital image include all of the following except
- contrast resolution.
 - noise efficiency.
 - sample resolution.
 - dose efficiency of the receptor.

ANS: C OBJ: Differentiate between analog and digital images.

4. Which of the following statements is not true?
- Matrix size can change without affecting the FOV.
 - FOV can change without affecting the matrix.
 - Changing the matrix or the FOV will change the size of the pixel.
 - Changing the matrix and the FOV will not change the size of the pixel.

ANS: D OBJ: Relate pixel size, matrix size, and FOV to each other.

5. Each square in a matrix is called a
- matrix element.
 - picture element.
 - bit.
 - byte.

ANS: B OBJ: Define pixel and image matrix and characteristics of each.

6. The number of bits per pixel is known as bit
- pitch.
 - depth.
 - height.
 - width.

ANS: B OBJ: Define pixel and image matrix and characteristics of each.

7. If a pixel has a bit depth of 29, the number of gray tones that pixel can produce is
- 256.
 - 512.
 - 1024.
 - 2500.

ANS: B OBJ: Define pixel and image matrix and characteristics of each.

8. The size of the pixel is determined by the
- bit.
 - bit depth.
 - matrix.
 - byte.

ANS: C OBJ: Define pixel and image matrix and characteristics of each.

9. Which of the following statements is not true?
- Exposure index* refers to the amount of exposure to the patient.
 - Exposure index* refers to the amount of exposure to the image receptor.
 - Exposure is not uniformly represented across manufacturers.
 - Exposure index standardization is beneficial to the technologist.

ANS: A OBJ: Discriminate between standard units of measure for exposure indicators.

10. The measurement for radiation that was incident on the image receptor for a particular exposure is known as
- Gy.
 - KSTD.
 - KIND.
 - KTGT.

ANS: C OBJ: Discriminate between standard units of measure for exposure indicators.

11. Deviation index is the difference between _____ and _____ expressed in logarithmic fashion.
- actual exposure (KIND); target exposure (KTGT)
 - standard exposure (KSTD); actual exposure (KIND)
 - standard exposure (KSTD); target exposure (KTGT)

ANS: A OBJ: Discriminate between standard units of measure for exposure indicators.

12. Factors that can adversely affect the pixel values expressed in the deviation index include all of the following except
- gonadal shielding within the image.
 - a prosthesis within the image.
 - failure of the system to recognize the exposure indicator.
 - failure of the system to recognize the collimated border.

ANS: C OBJ: Discriminate between standard units of measure for exposure indicators.

13. How dark or light a digital image appears on a display monitor is known as

- a. density.
- b. contrast resolution.
- c. brightness.
- d. spatial resolution.

ANS: C OBJ: Define image brightness.

14. The ability of a digital system to display subtle changes in shades of gray is called
- a. image quality.
 - b. contrast resolution.
 - c. spatial resolution.
 - d. dynamic range.

ANS: B OBJ: Discuss the differences between spatial and contrast resolution.

15. The ability of an imaging system to demonstrate small details of an object is known as
- a. image quality.
 - b. contrast resolution.
 - c. spatial resolution.
 - d. dynamic range.

ANS: C OBJ: Discuss the differences between spatial and contrast resolution.

16. A system's ability to respond to varying levels of exposure, resulting in more detail, is referred to as
- a. spatial resolution.
 - b. dynamic range.
 - c. contrast resolution.
 - d. dynamic resolution.

ANS: B OBJ: Discuss the differences between spatial and contrast resolution.

17. "The sum of the components in a recording system cannot be greater than the system as a whole" is a definition of
- a. modulation transfer function (MTF).
 - b. enhanced visualization image processing.
 - c. digital image contrast and density latitude.
 - d. principles of contrast enhancement.

ANS: A

OBJ: Discuss the implications of image noise, MTF, and detective quantum efficiency.

18. A perfect image processing system would have an MTF of
- a. 1%.
 - b. 10%.
 - c. 100%.
 - d. 1000%.

ANS: C

OBJ: Discuss the implications of image noise, MTF, and detective quantum efficiency.

19. The more light spread, the _____ the MTF.
- a. higher

- b. lower
- c. more equal
- d. None of these

ANS: B

OBJ: Discuss the implications of image noise, MTF, and detective quantum efficiency.

20. The range of exposure values the image detector is able to produce is known as
- a. dynamic range.
 - b. modulation transfer.
 - c. latitude.
 - d. detective quantum efficiency.

ANS: C

OBJ: Define exposure latitude.

21. The efficiency of a system to convert x-ray input signal into a useful output image is known as
- a. dynamic range.
 - b. spatial resolution.
 - c. latitude.
 - d. detective quantum efficiency.

ANS: D

OBJ: Define exposure latitude.

TRUE/FALSE

1. Air kerma is the measurement of radiation energy absorbed in a unit of air.

ANS: T

OBJ: Discriminate between standard units of measure for exposure indicators.

2. The reflection of ambient light can be problematic with monochromatic monitors.

ANS: T

OBJ: Define image brightness.

3. MTF is a way to quantify the contribution of each system component and the component's overall efficiency.

ANS: F

OBJ: Discuss the implications of image noise, MTF, and detective quantum efficiency.

4. It is possible to achieve an MTF of 100%.

ANS: F

OBJ: Discuss the implications of image noise, MTF, and detective quantum efficiency.