DIGITAL RADIOGRAPHY

CHAPTER 1 – INTRODUCTION TO DIGITAL RADIOGRAPHY (Chapters 1-6)

1. The concept of moving images digitally was introduced by Abler Jutras during his experimentation with _____ in the 1950s.
    a. PACS
    b. CT
    c. Teleradiology
    d. MRI
2. What system uses an x-ray absorber material coupled to a thin film transistor to form the image?
    a. Image capture system
    b. Electronic annotation system
    c. Film/screen system
    d. Flat panel detector system
3. Flat panel detector systems are divided into how many categories?
    a. One
    b. Two
    c. Three
    d. Four
4. What devices convert the incident x-ray energy directly into an electrical signal?
    a. Indirect capture digital radiography
    b. Direct capture digital radiography
    c. Flat pane detectors
    d. Teleradiology
5. In digital projection imaging, image processing takes place in a _____.
    a. Darkroom
    b. Computer
    c. Cassette
    d. Digital recorder
6. The acronym PACS stands for which of the following terms?
    a. Picture arrival computer system
    b. Picture archival computer system
    c. Picture arrival communication system
    d. Picture archiving and communication system
7. PACS is a networked group of _____ that can be used to manage digital images.
    a. Computers and servers
    b. Archives
    c. Darkrooms
    d. A&B
8. A PACS consists of different parts such as:
    a. Reading and physician review stations
    b. Technologist's QC station
    c. Administrative stations
    d. All the above

9. PACS can receive images from any hospital department that send in a _____ format.
    a. Film
    b. Analog
    c. Enhanced
    d. DICOM
10. Digital images are easily retrieved if they have **not** been properly and accurately identified.
    a. True
    b. False
11. Technologists markers are critical because digital image receptors and related software may show images on the monitor _____ making the determination of side (L/R) nearly impossible.
    a. Upside down
    b. Flipped
    c. Upside down and/or backward
    d. Rotated
12. Intensifying screens are used to increase the effect of x-ray _____.
    a. Electrons
    b. Protons
    c. Photons
    d. Neutrons
13. Technical factors should change to _____ the exposure as much a possible without sacrificing image quality.
    a. Increase
    b. Lower
    c. Alter
    d. Impact

CHAPTER 2 – DIGITAL IMAGE CHARACTERISTICS

14. The pixel size is directly related to the amount of _____ in the image.
    a. Detail
    b. Contrast
    c. Latitude
    d. Magnification
15. What is a square arrangement of columns and rows known as?
    a. Pixelization
    b. Magnification
    c. Matrix
    d. Standardization
16. What refers to the amount of a patient's body part included in an image?
    a. Contrast resolution
    b. Pixel size
    c. Matrix size
    d. Field of view

17. What is the term used to describe the digital image appearance on the computer monitor?
    a. Contrast resolution
    b. Gray scale
    c. Brightness
    d. Signal
18. _____refers to the digital system's ability to demonstrate subtle differences.
    a. Latitude
    b. Contrast resolution
    c. Detail
    d. Image quality
19. The ability of the imaging system to demonstrate small details of an object is known as _____.
    a. Contrast
    b. Latitude
    c. Field of view
    d. Spatial resolution
20. What is the ability of a system to record available spatial frequencies know as?
    a. Histogram
    b. Processing function
    c. Sampling function
    d. Modulation transfer function
21. Anatomic noise can be controlled by the radiographer while equipment noise cannot.
    a. True
    b. False
22. What refers to the range of exposure image values the detector is able to produce?
    a. Signal
    b. Resolution
    c. Latitude
    d. Contrast

CHAPTER 3 – DIGITAL RADIOGRAPHIC IMAGE PROCESSING AND MANIPULATION

23. The data within the collimated area produces a graphic representation of the optimal densities is called a _____.
    a. Image
    b. Histogram
    c. Data point
    d. Processor
24. With _____, the plate is scanned and the image's location in determined and a value placed on each pixel.
    a. Image sampling
    b. Image resolution
    c. Pixel processing
    d. High resolution

25. The shape of a histogram generated from a chest x-ray on an adult will look very different from a pediatric knee histogram.
    a. True
    b. False
26. Who described a way to convert analop signals into digital signals that would accurately transmit over telephone lines?
    a. Harry Smith
    b. Joe Bledsoe
    c. Harry Nyquist
    d. Neil Armstrong
27. What is caused when signal frequencies are produced above the Nyguist frequency?
    a. Heat
    b. Contrast
    c. Aliasing
    d. Scatter
28. _____means that images are produced with uniform density and contrast, regardless of the amount of exposure.
    a. Transmitted
    b. Foldover
    c. Automatic rescaling
    d. Manipulation
29. What term is widely used to explain the use of higher mAs values than is necessary to avoid quantum mottle?
    a. Frequency
    b. Exposure
    c. Detection
    d. Dose creep
30. Converting the digital input data to an image with appropriate brightness and contrast enhancement parameters is called _____.
    a. Rescaling
    b. Sampling
    c. Resolution adjustment
    d. Contrast manipulation
31. Detail or sharpness is referred to as _____.
    a. Spatial frequency resolution
    b. Filtering
    c. Smoothing
    d. Enhancement
32. Many health care facilities **do** want the technologist to manipulate the image before it goes to the picture archiving and PACS.
    a. True
    b. False

33. What occurs when fewer pixels are included in the signal average?
    a. Contrasting
    b. Filtering
    c. Edge enhancement
    d. Digitizing
34. Low pass filtering is also known as what?
    a. Image enhancement
    b. Masking
    c. Manipulation
    d. Smoothing
35. Brightness and contrast are the most common image processing parameters.
    a. True
    b. False
36. What controls how bright or dark the screen is?
    a. Filtering
    b. Smoothing
    c. Window level
    d. Noise reduction
37. What controls the ratio of black and white, or contrast?
    a. Shuttering
    b. Magnification
    c. Window width
    d. Filtering
38. In digital imaging, automatic _____ is used to blacken out the white collimation borders.
    a. Controls
    b. Contrast
    c. Shuttering
    d. Parameters
39. What refers to the way anatomy is oriented on the imaging plate?
    a. Image identification
    b. Image orientation
    c. Image annotation
    d. Image manipulation
40. When anatomy is too large to fit on one cassette, the process of joining multiple images is called what?
    a. Image enhancement
    b. Image stitching
    c. Image contour
    d. Image correction
41. The _____ function allows selection of reset terms and/or manual text input.
    a. Image parameter
    b. Image reduction
    c. Image collimation
    d. Image annotation

42. How many types of magnification techniques come standard with digital systems?
    a. 1
    b. 2
    c. 3
    d. 4
43. The zoom technique **does not** allow magnification of the entire image.
    a. True
    b. False
44. Patient demographics include:
    a. Patient name and date of birth
    b. Healthcare facility and patient ID number
    c. Examination date
    d. All of the above
45. The _____ function allows the quality control technologist to select one or more local computers to receive images.
    a. Image manipulation
    b. Archive query
    c. Manual send
    d. Distribution
46. What is the function that allows retrieval of images from the PACS?
    a. Image stitching
    b. Image distribution
    c. Archive query
    d. Image query

CHAPTER 4 – PHOTOSTIMULABLE PHOSPHOR IMAGE CAPTURE

47. In PCP systems, the radiographic image is recorded on a thin sheet of plastic known as the _____.
    a. Cassette
    b. Reader
    c. Imaging plate
    d. sheet enhancer
48. The phosphor layer “traps” _____ during image exposure.
    a. Photons
    b. Neutrons
    c. Electrons
    d. Protons
49. What layer of an image plate sends light in a forward direction when it is released in a cassette reader?
    a. Protective layer
    b. Phosphor layer
    c. Conductive layer
    d. Reflective layer

50. What layer of the imaging plate absorbs and reduces static electricity?
    a. Protective layer
    b. Reflective layer
    c. Conductive layer
    d. Phosphor layer
51. What is the movement of the laser across the imaging plate called?
    a. Slow scan direction
    b. Translation
    c. Sub-scan direction
    d. Fast scan direction
52. During the image plate scanning, how many electron volts are necessary to energize the trapped electrons?
    a. 2 eV
    b. 4 eV
    c. 6 eV
    d. 8 eV
53. What is the amount of detail present on an image called?
    a. Image contrast
    b. Image brightness
    c. Spatial resolution
    d. Image enhancement
54. What is the kVp range on most digital projection systems?
    a. 45-100 kVp
    b. 45-110 kVp
    c. 45-115 kVp
    d. 45-120 kVp

CHAPTER 5 – FLAT PANEL IMAGE ACQUISITION

55. What year was the first thin-film transistor (TFT) introduced?
    a. 1986
    b. 1990
    c. 1995
    d. 1996
56. A photoconductor:
    a. Produces light when absorbing x-rays
    b. Produces x-rays when absorbing light
    c. Absorbs light and produces electric charges
    d. Absorbs x-ray and produces electric charges
57. A field effect transistor (FET) can read more than a million pixels in less than how many seconds?
    a. 1
    b. 2
    c. 3
    d. 4

58. Gain calibration is used to correct flaws in the _____.
    a. Cassette
    b. Image
    c. Detector
    d. Pixels
59. What is it called when a faint image from a previous exposure is visible?
    a. Image shadowing
    b. Image duplication
    c. Image lag
    d. Image overexposure

CHAPTER 6 – CCD/CMOS IMAGE CAPTURE

60. What components make up a charge-coupled device (CCD)?
    a. Photosensitive receptor
    b. Sensors
    c. Embedded electronics
    d. A&C
61. Each pixel or detector element (del) contains _____ electrodes that hold the electrons in an electrical potential well.
    a. two
    b. three
    c. six
    d. seven
62. The type of scintillator and the way it is constructed will determine:
    a. How much of the incident x-ray photons are absorbed
    b. How much light is produced
    c. The wavelength or color of the light
    d. All the above
63. CsI **is not** a particularly common scintillator.
    a. True
    b. False
64. The lens or fiber optics is used to focus what onto the CCD chip?
    a. Images
    b. Light
    c. Electrons
    d. Signal
65. The amount of electrons produced relative to the incident light from the scintillator is the _____of the CCD.
    a. Spectrum sensitivity
    b. Application
    c. Quantum efficiency
    d. Effectiveness

66. What types of noise is associated with CCD technology?
    a. Statistical noise
    b. Current noise
    c. Amplification noise
    d. All the above
67. Amplification noise is common to what systems?
    a. Analog systems
    b. Digital systems
    c. Fiber optic systems
    d. All systems
68. For stereotactic breast biopsies what size chip is used that results in some demagnification?
    a. 0.5 cm × 0.5 cm
    b. 1.0 cm × 1.0 cm
    c. 2.0 cm × 2.0 cm
    d. 2.5 cm × 2.5 cm
69. In general radiography, CCD's may be tiled in a _____array to a single CCD.
    a. 5 × 7
    b. 8 × 10
    c. 14 × 17
    d. 16 ×12
70. What company developed complementary metal oxide semiconductors systems?
    a. IBM
    b. NASA
    c. Boeing
    d. Orbital Sciences
71. What is a solid chemical element or compound that conducts electricity under some conditions but not others?
    a. Detector element
    b. Capacitor
    c. Scintillator
    d. Semiconductor
72. What is the most popular semiconductor material?
    a. Boron
    b. Carbon
    c. Silicon
    d. Sulfur