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## Question # 1

→ Describe the features of preprocessing and post processing.

### → Preprocessing :-

- A principal advantage of digital radiographic image over screen film radiographic imaging is the ability to manipulate before display - preprocessing and after display post processing.
- Usually for purpose of improving image contrast.
  - preprocessing is largely automatic
  - Preprocessing is designed to produce artifact-free digital images
  - it provide electronic calibration to reduce pixel-to-pixel, row-to-row, column-to-column response difference.
  - The processes of pixel interpolation lag correction & noise correction.



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are automatically applied with most systems.

→ Offset images and gain images are automatic calibrations images designed to make the response of image receptor uniform.

→ Averaging techniques also are used to reduce noise & improve contrast.

→ The individual pixels defective and to respond differently such defects are corrected by signal interpolation.

## → Post processing :-

→ Post processing is where digital imaging shines.

→ Post processing requires intervention by radiologist.

→ Post processing refers to anything that can be done to a digital radiographic image after it is acquired by the imaging system.



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- Post processing of digital images requires operator manipulation
- Post processing of is performed to optimize the appearance of the image for the purpose of better detecting pathology.
- Annotation is the process of adding text to an image.
- By window & level adjustment we make all 65,536 shades of grey visible.
- The large multiple digital image must be flipped horizontally or vertically called image flip.
- The large matrix size digital display devices have better spatial resolution because they have smaller pixels.
- Subtraction of digital radiographic images obtained months apart. The purpose of image subtraction is to enhance contrast.
- The misregistration of subtraction image is corrected by technique called pixel shift.



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- Edge enhancement is effective for fractures & small, high contrast tissues.
- High lighting can be effective for identifying diffuse non-focal disease.
- Pan, scroll & zoom allows for careful visualization of precise regions of an image.

## Question # 2

- Distinguish between spatial resolution & contrast resolution.

### → Spatial resolution:-

Spatial resolution is the ability of an imaging system to resolve and render on the image a small high contrast object.

- Shows black dots of diminishing size on a tan background.

### → Contrast resolution:-

Contrast resolution is the ability to distinguish many



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Shades of gray from black to white.

→ The measure is used in medical imaging to quantify the quality of acquired images.

### Question # 3

→ Discuss the characteristics of digital imaging that should result in lower patient radiation doses.

→ Answer:-

→ Exposures should not be repeated in digital radiography because of brightness or contrast concerns.

→ DR systems cannot compensate for excessive noise caused by quantum mottle.

→ Overexposed images do not have to be repeated & should not become a habit.

→ Patient dose in DR should be low because of high DQE of the image receptor.

→ Contrast resolution is preserved in digital imaging regardless of doses.



## Question # 4

→ Discuss the feature of an active matrix liquid crystal display.

→ Answer:-

→ TV, computer, table computers and smartphones with an LCD screen due to low screens weight colour & good quality response time.

→ The most common type of AMOLED contain, beside the polarizing sheets and cells of liquid crystal, a matrix of thin film transistor liquid crystal display.

→ LCD's are superior to CT displays

→ It has high property of ordered molecular structure, a crystal & property of viscosity of fluid.

→ liquid crystal are linear organic molecules that are electrically charged forming a natural molecular dipole.



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- Each pixel contains light polarizing filters & films color AMOLED have red, green, blue filters
  - Spatial resolution improves with higher megapixel display devices
  - Flat panel digital display devices are identified by the number of pixels in AMOLED.
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## Question # 5

→ Identify application of the picture archiving & communication system.

### → Picture archiving & communication system Application:-

→ Hard copy replacement:-

Hard-copy based means of managing medical images, such as film archived with the decreasing price of digital storage.

→ Digital copies are referred to soft-copy.

→ Remote access:-

it expands on the possibilities of conventional systems by providing capabilities of off site viewing & reporting.

→ Electronic image integration platform :-

Pacs provide the electronic platform for radiology images interfacing



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with other medical automation systems.

→ Radiology workflow Management:

PACS is used by radiology personnel to manage the workflow of patient exams.

## Question # 6.

→ Discuss the three type of digital radiographic imaging artifacts and how to avoid them.

→ Answer: Image receptor:-

occur with screen film image receptors, digital image receptors can suffer from rough handling, scratches & dust.

→ Artifacts can be correct easily with proper cleaning.

→ Software Artifacts:

→ obtained as raw data sets.

→ For processing images are manipulated in to for presentation.



→ Before "for processing" several manipulations of the output of an image receptor may be necessary to correct for potential artifacts which are dead pixels or dead rows or columns of pixels.

## → Object Artifacts:-

- arise from the errors in patient position, x-ray beam collimation and histogram selection.
  - Backscatter radiation can also trouble because of sensitivity of DR.
  - To avoid this artifact back side of image receptor should be shielded to reduce back-scatter x-ray.
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## Question # 7

→ Describe the basis for data compression & the difference b/w lossless & lossy compressions.

### → Data Compression :-

occur with exposure to the raw x-ray beam when all values are the same. Such compression techniques are describe by lossless or lossy.

#### → Lossless :-

An image file that can be reconstructed to be exactly the same as original.

→ Lossless compression reduces the data file to 10% (10:1) to 50% (2:1) of the original file.

#### → Lossy :-

can provide compression factor of up to (100:1) or greater used an image in which exact measurement of fine detail is not required. Such as video recording.



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## Question # 8.

→ Identify the difference b/w for-processing image & for presentation images.

### → FOR-processing image:-

FOR-processing image is obtain from raw data set of digital radiographic image.

### → FOR-presentation image:-

The image which is obtain by manipulating of "for-processing know as for-presentation image.

→ that can use for QC.

## Question # 9

→ Explain how digital radiographic image artifacts occur because of improper collimation, partition or Alignment.



## → Collimation & Partition:-

- If the x-ray exposure field is not properly collimated field recognition errors may occur.
- Histogram analysis error can occur.
- The result is very dark or very light or very noisy images
- Collimation is important for radiation dose reduction and for improved image contrast.
- If multiple fields are projected on to a single IP, each have clear collimation edge & margins b/w each field which is called partitioning
- Allows 2 or more images to be projected on a single IP.

## → Alignment:-

- Also important as collimation exposure on IP.
- When an image field is not orientated with the size & dimensions of the IP, image artifacts can appear.