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CR & DR

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## QNO#1

Describe the features of Preprocessing and Postprocessing.

### Preprocessing :-

- A Principal advantage of digital radiographic imaging over screen film radiographic imaging is the ability to manipulate the image before and after display preprocessing and Postprocessing, respectively.
- Preimage Processing and Post image processing alter image appearance, usually for the purpose of improving image contrast.
- Preprocessing is design to produce artifact free digital image.
- Preprocessing provides electronic calibration to reduce Pixel-Pixel, row-row, and column-to-column response differences.
- Each type of digital image receptor generate an electronic latent image that may not be made visible completely.
- The solution is to apply a voltage correction from a row or a column of pixels in a dark, unirradiated area of the image receptor.
- Preprocessing of digital images is largely automatic.

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## Postprocessing :-

- Postprocessing is where digital imaging shines.
- In contrast to preprocessing, which is largely automatic, post processing requires intervention by the radiologic technologist and the radiologist.
- Postprocessing refers to anything that can be done to a digital radiographic image after it is acquired by the imaging system.
- Post processing of the digital radiographic image 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.
- It is often helpful in informing the clinician about anatomy and diagnosis.
- Most digital radiographic images are viewed through the contrast rendition of screen film images, Bone is white, and soft tissue is black.
- Sometime pathology can be visible with 'image inversion', which result in a black appearance of bone and a white appearance of soft tissue.
- Postprocessing of digital images requires operator manipulation.

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## QNO#2:

Distinguish between spatial resolution and contrast resolution?

### Differences :-

#### 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 shades of gray from black to white.

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

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QNO#3:

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

## Dose Reduction With digital Radiography &

- Exposures should not be repeated in digital radiography (DR) because of brightness or contrast concerns.
- Digital radiography cannot compensate for excessive noise caused by quantum mottle.
- Overexposed images do not have to be repeated and should not become a habit.
- Poor technical factor selection may result in overexposure of the patient.
- Digital imaging techniques must be approached differently, instead of 'dose creep', 'technique creep' should be used with each of the various digital imaging system.
- The result will be patient radiation dose reduction.

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QNO#4

Discuss the feature of an active matrix liquid crystal display ?

## Liquid Crystal Display :-

- A liquid crystal is a material state between that of a liquid and a solid.
- A liquid crystal has the property of a highly ordered molecular structure — a crystal — and the property of viscosity — a fluid.
- Liquid crystal material are linear organic molecules that are electrically charged, forming a natural molecular dipole.
- Consequently, the liquid crystals can be aligned through the action of an external electric field.
- Liquid crystal display are fashioned pixel by pixel.
- Each pixel contains light-polarizing filters and films to control the intensity and color of light transmitted through the pixel.

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QNO # 5:

Identify application of the picture archiving and communication system.

## Picture Archiving And Communication Sys<sup>o</sup>

- Radiology has adopted digital imaging very rapidly.
- Estimate of the present level of digitally acquired images range up to 95%.
- These digital images comes from every area of medical imaging, including nuclear medicine, diagnostic ultrasonography, radiography, fluroscopy, CT, & MRI.
- Screen film radiograph can be digitized with the use of a device.
- Such film digitizers are based on laser beam technology.
- A picture archiving and communication system (PACS), when fully implemented, allows not only the acquisition but also the interpretation and storage of each medical image in digital form without resorting to film (hard copy).
- The projected efficiency of time and cost are enormous.
- PACS improves image interpretation, processing, viewing, storage, and recall.
- The four principal components of a PACS are the image acquisition system, the display system, the network, and the storage system.

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## QNO#6

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

### Digital Radiographic Imaging Artifacts :-

An artifact is any false visual feature on a medical image that simulates tissue or obscures tissue. Artifacts interfere with diagnosis and must be avoided.

#### 1) Image Receptor Artifacts :-

- Digital image receptors can suffer from rough handling, scratches, and dust.
- Digital radiographic image receptors have unique artifacts associated with pixel failure.
- Environmental radiation can contribute to ghost artifacts.

#### 2) Software Artifacts :-

- Histograms
- Range / scaling
- Image Compression.

#### 3) Object Artifacts :-

- Patient Positioning
- Collimator / Partition
- Backscatter.



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## Avoiding Artifacts :-

- Cassettes and image plates should be handled with care.
- Regular cleaning of imaging plates with proper cleaner (Ethyl Alcohol).
- Paper towels or gauze should not be used because they have fibers on the plate, the use of lint free cloth is advisable.
- Reduce back scatter by lowering KV or proper collimation.
- Proper exposure factors to be used based on body part and patient size.
- Proper education of radiographs in handling of cassettes.

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Q NO #7:

Describe the basis for data compression and the difference between lossless & lossy compression?

## Data Compression &

Data compression, source coding, or bit rate reduction is the process of encoding information using fewer bits than the original representation.

Any particular compression is either lossy or lossless.

## Differences btw Lossy & Lossless Compression :-

### Lossy Compression &

Lossy compression restores the large file to its original form with loss of some data which can be considered as not-noticeable.

### Lossless Compression &

Lossless compression restores the large file to its original form without any loss of data.

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QNO # 8 :-

Identify the difference between for processing images and 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.

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## QNO#9

Explain how digital radiographic image artifacts occur because of improper collimation, Partition or alignment.

### Collimation :-

- If the X-ray exposure field is not properly collimated, sized, and positioned, exposure field recognition errors may occur.
- Can lead to histogram, the result is very dark, or very light or very noisy images.
- If images are not collimated and centered, image receptor exposure will not be accurate and cannot be used for image quality evaluation.

### Partition :-

- If multiple fields are projected onto a single IP, each must have clear, collimated edges and margins between each field.
- This process called Partitioning, allows two or more images to be projected on a single IP.

### Alignment :-

- When an image field, is not oriented with the size and dimensions of the IP, image artifact can appear.

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