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Paper

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Q=1 Ans.

1: <sup>1</sup> Ans Preprocessing of digital Radiographic Image:-

A principal advantages of digital radiographic imaging over Screen Film radiographic imaging is the ability to manipulate the image before and after display. Preprocessing is processing respectively preimage processing and post image processing after image appearance usually for the purpose of improving image contrast.

Preprocessing of digital image is largely automatic.

Pre processing is designed to produce artifact free digital image. In this required pre processing produce electronic calibration to reduce pixel to pixel row to row and column to column response differences.

offset image and gain images are automatic calibration image

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designed to make the response of the image receptor uniform image are generated after few months and offset image are generated many times each days.

### Digital imaging processing:

Problem	Solution.
↳ Detective Pixel:-	interpolate adjacent Pixel signals
↳ Image lag:-	offset. Contrast
↳ line noise:-	Correct From Clark reference zone.

### \* Post processing.

is where digital shine. In contrast to preprocessing which are largely automatic postprocessing require interaction by the radiologic technologist - postprocessing refers to anything that can be done to a digital radiographic image after it is acquired by the imaging system.

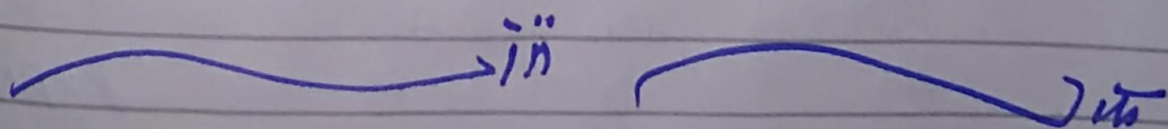
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post processing of digital image require operator

manipulation Post processing of the digital radiographic image is performed to appearance the image after it is acquired by the imaging system. For the purpose of better pathology.

Annotation is the process of adding text to an image. In addition to patient identification annotation is often helpful about anatomy and diagnose. The larger matrix size digital display devices have better

Spatial resolution because they have smaller pixel. They allow among other properties magnification of region of an image to render the smallest detail visible.



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Q=2 Ans:-

Ans 2

### \* Contrast Resolution:-

- Contrast resolution describe the property of distinguishing b/w similar tissues, for-example gray-white matter in the brain, or differentiating B/w the liver & spleen.
- Contrast resolution demonstrates the ability to differentially diagnose different lesions according to their color index on the grey scale.
- All digital imaging system have better contrast resolution than screen film imaging.

### \* Spatial Resolution:-

The ability of an imaging system to resolve and render on the image a small & high contrast object.

Spatial resolution refers to the ability of imaging instrument to provide the sharpness or detail of image.

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Q=3 Ans.

ans 3

\* Characteristic of a Digital Image:-

A digital image begins as an analog signals - Through Computer data processing - The image become digitized and is sampled multiple times - The critical characteristic of a digital image are spatial resolution, contrast resolution, noise, and dose efficiency (of the receptors) however, to fully grasp how a digital image is formed, an understanding of its basic components is necessary.

1:- Pixel:-

A pixel or picture element is the smallest element in a digital image - If you have ever magnified a digital picture to the point that you see the image as small square of color you have seen pixels spatially the digital image is separated into pixels with discrete value.

2 Pixel Size:-

The size of the pixels is directly related to the amount of the spatial resolution - or detailed in the image -

For example the smaller the pixel is the greater the detail. Pixel size may change when the size of the matrix or the FOV changes.

3 Pixel Bit Depth:-

Each pixel contain pieces of bit of information

The number of bits within a pixels is known as pixel bit depth. If a pixel has a bit depth of 8, then the number of gray tones that pixels can produce is 2 to the power of the bit depth or  $2^8$  or 256 shades of gray.

4:- Matrix:-

A matrix is a square arrangement of number in columns and rows, and in digital imaging the number corresponds to discrete.

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pixels values. Each box within the matrix also corresponds to a specific location in the large image and corresponds to a specific area of the of the patients tissue.

5) Field of view:

The term field of view, or FOV is synonymous with the x-ray field. In other words, it is the amount of body parts or patient included in the image. The larger the FOV the more area is imaged. Changes in the FOV will not affect the size of the matrix. However changes in the matrix will affect pixel size. This is because the matrix increase and the FOV remains the same size, the pixel size must decrease to ~~fit~~ fit into the matrix.

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iii



Q = 4 Ans.

Ans 4

Features of an active matrix crystals display:-

An active-matrix liquid crystal display (AMLCD) is a type of flat-panel display technology for high resolution TVs, computer monitors, tablets computers and smartphones, and with an LCD screen due to low weight, very good image quality, wide color gamut and response time.



Q = 5 Ans.

Ans 5

Picture archiving and Communication System (PACS):-

A picture archiving and communication system when fully implemented allows not only the acquisition but also the interperation

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and storage of each medical image in digital form without restoring to film (hard copy). The projected efficiencies of time & cost are enormous.

→ PAC'S improve image interpretation, processing, viewing, storage & recall.

→ The four principal components of a PAC'S are the image acquisition system, the display system, the network & the storage system.

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Q = 6 Ans.

Ans<sup>6</sup>

There are three types of artifact.

- 1:- Image Receptors Artifact
- 2:- Software artifact
- 3:- Object artifact.

1:- Image Receptor Artifact

If a CR has not been used for 24 hours it should be erased again before use when a completely erased.

Digital imaging receptors can suffer from rough handling, scratches & dust

- Artifact produced by dust can be corrected easily with proper cleaning unless the dust is internal to the optics of the Computed radiography imaging system.

## 2. Software Artifact:-

- ↳ Digital radiographic images are obtained as raw data sets
- ↳ As such these images are ready "for processing"
- ↳ For-processing images are manipulated into "for presentation" images that the radiologic technologist can use for QC and for interpretation by the radiologist.

## 3. Object artifact:-

- ↳ object artifact can arise from the technologist error in patient positioning, x-ray beam collimation and histogram selection.
- ↳ Backscatter radiation also can be troublesome b/c of the sensitivity of the digital radiographic image receptors
- ↳ If a lot of scattering material is present behind the image receptors backscatter radiation can cause a phantom image

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If this type of artifact  
discovered the back side of the  
image receptors should be  
shielded to reduce back scatter  
x-rays.

iii ~~~~~ ii -

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Q = ~~7~~ Ans.

Ans ~~7~~

Definition of Lossy Compression:-

The lossy compression method eliminates some amount of data that is not noticeable. This technique does not allow a file to restore in its original form but significantly reduces the size. The lossy compression technique is beneficial if the quality of the data is not your priority. It slightly degrades the quality of the file or data but it is convenient when one wants to send or store the data. This type of data compression is used for organic data like audio signals and images.

Techniques:-

- ↳ Transform Coding
- ↳ Discrete ~~cosin~~ Cosine Transform (DCT)
- ↳ Discrete wavelet Transform (DWT)

Q:- Lossless:-

The lossless compression method is a capable of reconstituting the original form of the data. The quality of the data is not compromised. The techniques allows a file to restore its original form. - lossless compressions can be applied to any file format can improve the performance of the compression ratio.

Techniques:-

- ↳ Run length encoding
- ↳ Lempel-Ziv-welch
- ↳ Huffman coding.

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Q = 8 Ans.

Ans<sup>8</sup> Processing Image:-

Processing image is a method to perform some operation on an image in order to get an enhanced image or to extract some useful information from it.

It is a type of signal processing in which input is an image and output may be image or characteristic associated with that image.

Nowadays Images processing is among rapidly growing technologies. It forms core research area within engineering and computer science discipline too.

Image processing basically includes the following three steps:-

- ↳ Importing the image via image acquisition tools.
- ↳ Analysing & manipulating the images.
- ↳ output in which result can be altered image or report that is based on image analysis.



There are two types of method using for image processing namely

- 1:- Analogue
- 2:- Digital.

## 2:- Presentation Image:-

Your presentation image allow you to showcase your story through visuals - whether you choose photography, graphic design elements and so on, your imagery is key to helping you make your main point

Helping your audience to visualize your point is essential to a good presentation - while

your overall content and your slide design matter as well, you need high quality image to really prove your point to your audience.

Not only that, but people are visual learners -

They want to see you talking about -

Q=9 Ans.

Ans<sup>9</sup>Collimation & partitioning:

If the x-rays exposure field is not properly collimated size and positioned exposure field recognition errors may occur.

Result is very dark or very high or very noisy images.

Atomic radiation field recognition is essential for artifact free images. Proper collimation and centering prevent histogram errors that can lead to artifacts. Illustrate the opposite situation.

Partitioning of multiple digital images on a single IP results in proper separation and collimator of each images. Collimator of projected areas x-ray beam is

importance for patient radiation dose reduction and for improved image contrast is screen film radiography.

★ Alignment:

Alignment of the exposure field on the IP is important in the same way and for the same reason as collimator.

2) When an image field such as that is not oriented with the size and dimensions of the IP images artifact can appear.

The End.