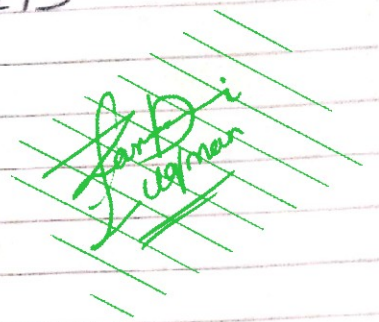


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BS- RADIOLOGY

INU PESHAWAR

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ANS QNO 1

=> "PREPROCESSING:-"

The principal advantages of digital radiographic imaging over screen-film radiographic imaging is the ability to manipulate the image before and after display preprocessing and postprocessing. Preimage processing and post image processing alter image appearance and usually for



The Purpose of Improving Image Contrast.

→ preprocessing of digital images is largely automatic.

preprocessing image is designed to produce artefact-free digital image.

pre-processing also provide electronic calibration to reduced pixel-to-pixel, row to row, column to column response difference.

"Digital Image preprocessing:-"

⇒ Problem Solution:-

→ Defective pixel: Interpolate adjacent pixel signals.

→ Image lag:- Offset correction.

Line noise: correct from dark, reference zone.

⇒ "OFFSET And Gain Image:-"

- are automatic calibration image designed to make the response of image receptors uniform.



Gain image are generated every few month, and offset image are generated many time each day.

⇒ "Signal Interpolation:-"

Digital image receptors and display devices have millions of pixels, its is responsible to expect some individual pixels such defect are corrected by signal interpolation.

⇒ "Image Lag:-"

Each type of digital image receptors generated an electronic latent image that may not be made visible completely, when remain "image lag" and this can be troublesome when one is switching from high dose, and low dose technique.

⇒ "POST-PROCESSING:-"

Post-processing is where digital imaging shines. In contrast to pre-processing, which is largely

automatic, post-processing requires intervention by the radiologic technologist and the radiologist.

Post processing refers to anything that can be done to a radiographic image after it is acquired by the image systems.

→ Post processing of digital image requires operators manipulation.

Post processing of digital radiographic image is performed to optimize the appearance of the image for purpose of better detecting pathology.

⇒ "Annotation:-"

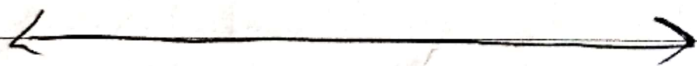
is the process of adding text to an image. In addition to patient identification, annotation is often helpful information the clinician about anatomy and diagnoses.



"Process" = "Result:-"

- Annotations: → Label The image.
- window and level:- → Expand The digital grayscale to visible:-
- magnification → Improve visualization and spatial resolution.
- Image Flip:- → Reorient image presentation.
- Image inversion:- → make white - black and black white.

Region of interest:- → Determine average pixel value for use in quantitative image.



"ANS QNO 2:-"

⇒ "SPATIAL RESOLUTION:-"

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

→ Spatial resolution is the ability



to render small object on image.

⇒ "CONTRAST RESOLUTION:-"

Hundred percent contrast is ~~total~~ black and white. The lettering on this page shows very high contrast. Contrast resolution is ability to distinguish many shades of gray from black and white. All digital imaging system have better contrast resolution than screen-film radiography.



"ANS QNO 3:-"

⇒ "PATIENT RADIATION DOSE:-"

with acceleration to all digital imaging we have the opportunity to reduced patient dose by 20% to 50% depending on the examination.

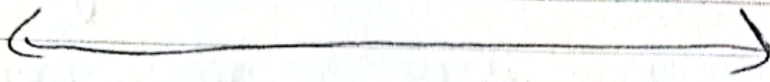
Digital imaging can always yield a good image. it is possible to radiologist to be lured into out adjusting exposures as frequently as



as with Screen Film.

For example:-

Changing view factor from lateral to anteroposterior (AP) view when these are taken consecutively. As a result it is possible to reduce overall patient radiation dose.



Ans QNO 4:-

"LIQUID CRYSTAL DISPLAY:-"

A Liquid crystal is a material state between that of a liquid and solid.

LCD and superior CRT display.

Consequently, the Liquid crystal can be aligned through the action of an external electric field.

→ "Display Characteristics:-"

LCD are fashioned pixel by pixel.

The LCD has a very intense white backlight that illuminates each pixel.



display or 2000 x 2500 pixel of arrangement.



"ANS @ NO 5:-"

⇒ Picture Archiving and

Communication System (PACS):-

PACS is a modality of imaging technology which help in image transmission from the site of image acquisition to multiple physically disparate location. This Technology not only is economically economical (Film less department) but also convenient to access multiple modalities Radiograph, CT, MRI, ultrasound etc.

PACS improves image interpretation, processing, viewing, storage and recall. PACS, when fully implemented, allow not only the acquisition but also the interpretation and storage of each medical image



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in digital form without resorting  
the film.

⇒ "NETWORK:-"

In radiology, in addition to secret-  
arial workstations the network may  
consist of various types of devices  
that allow storage, and viewing of  
image, PACS network stations remote  
PACS workstation, a departmental  
mainframe and hospital mainframe.

Computer Scientists use The  
term network to describe the manner  
in which many computers can be  
connected to interact with one another.

Any hospital at any times can  
enter the unique identifier and access  
the medical records for that patients.

→ Now PACS expands the system  
now includes images.

⇒ "STORAGE SYSTEMS:-"

one motivation for PACS is archiving,  
how often are films checked out  
from film room and never returned.



image storage requirements are determined by the number of image and the image data file size. Image file size is the product of the matrix size and the grayscale is the product of scale bit depth.



"ANS QNO 6:-"

⇒ "Artifacts:-"

An artifact is any false visual feature on a medical image that simulate tissue or obscures tissue.

"TYPES OF ARTIFACTS:-"

There are three types of artifact that can be seen on radiographic film.

(1) ⇒ "Image Receptor Artifacts:-"

Image receptor artifacts show on film such as dust, dirt, or scratches, pixel malfunction and ghost image.



Annex Day\* (Cambridge N2)

## (1) "DUST, DIRT OR SCARTCHES:-"

This artifacts such as dust or dirt usually removed easily by cleaning by technician with proper cleaning unless the dust is internal optics of CR imaging system.

Scratches or a substantial mal-function of pixel likely require the replacement of the image receptors.

## (2) "GHOST IMAGE:-"

Ghost image occurs due to incomplete erasure of a previous image on a CR IP. Such artifact can be correct by additional signal erasure technique

## ⇒ "SOFTWARE ARTIFACTS:-"

### (A) Image Compression:-

Image compression performed to reduce the size of image file produce so the image can be transmitted easier.



(a) Lossless Compression:-

allows us to reconstruct the image the same way to reduced data at 3:2

(B) Lossy Compression:-

used for image where fine detail is no required. Example video recording reduced data 100:1 or greater.

(2) "PREPROCESSING:-"

Preprocessing is the step before for processing. Several manipulation of output of an image receptor may be necessary to correct for potential artifacts.

→ Interpolation would be used for preprocessing in the case of signal defective pixel.

→ Flat Fielding is used to equalize the response of ~~each~~ each pixel to uniform x-ray beam.

### (3) => "HISTOGRAM:-"

is a graph of the frequency of digital values. The Y axis is the number of amount, while X-axis is the digital value (the density or brightness of a pixel) the shape of the histogram is characteristic of anatomical part done in pre-processing selection of the wrong histogram will result in an image represented wrong.

### (3) "Object Artifacts:-"

#### (1) "Collimation and partition:-"

It used to avoid exposure field recognition errors which could also lead to histogram error receptor want four define / distinct corner of the collimations.

Proper collimation has added value of defining the image histogram. proper collimation and



Centering prevent histogram errors that can lead to artifacts.

⇒ "PARTITIONING:-"

multiple field projected onto one plate each must have clear, collimated edges and margins between each field.

partitioning of multiple digital image on a single plate result in proper separation and collimation of each image.

→ Digital image receptor recognize four collimated border.

⇒ (II) "POSITIONING:-"

Body parts of patient should be centered to the IR. Digital image receptor normally recognize image in the center of the image receptors.

⇒ Alignment:-

Image should be aligned to the image plate. Alignment of the exposure field on the IP is important in the same way and

For the same reason as collimation.



Ans Q no 7:-

"DATA COMPRESSION:-"

Data Compression takes advantage of redundancy of data, as occurs with exposure to raw x-ray beam when all values are the same. Such compression techniques are described as lossless or lossy.

⇒ "Lossless Compression:-"

reduced the data file to 10% to 50% of the original file. However this is not satisfactory for large image files b/c transmission time and data manipulation time can still be unacceptable.

⇒ Lossy Compression:-

which can provide compression factor upto 100:1 or greater, can be used on image in which



exact measuring or fine  
required detail.



"Ans Q<sub>NO</sub> 8:-"

⇒ "PROCESSING IMAGE:-"

Image processing is a critical of obtaining high quality digital radio-graph. Because radiologist may have different preferences in image appearance. It is helpful to know that many aspects of image appearance can be changed by image processing, and new preferred setting you can be located into computer and saved so that it can become standard processing methods. Image processing overall optic change optical density of an image and to change its contrast.

"Ans Q<sub>NO</sub> 9:-"

→ "Collimation and Partition:-"

If the x-ray exposure field is not properly collimated sized and positioned, exposure field recognition errors may occur. These can lead to histogram analysis error because signal outside the exposure field is included in histogram. The result is very dark or very light or very noisy image.

Collimation of projected area x-ray beam is important for patient radiation dose reduction and for improved image contrast in screen-film radiography. In DR proper collimation has added value of defining the image histogram.

⇒ "PARTITION:-"

multiple image projecting on one plate called partition. partitioning of



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multiple digital image on a single IP result in proper separation and collimation of each image

### "Alignment:-"

Alignment of the exposure field on IP is importance in the same way and for the same reason as collimation. whe an image field is not oriented with size and dimensions of the IP, image artifacts can appear.



THE END