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Answer No: 01

Digital Fluoroscopy imaging system

⇒ Fluoroscopy, or real-time Projection x-ray imaging, has been in clinical use since shorty after Rentgen's discovery of x-rays.

⇒ Early Fluoroscopes consisted simply of an x-ray source and a Fluorescent screen, between wich the patient was placed.

⇒ After passing through the patient, the remant beam impinged upon the fluorecent screen and produced a visible glow, which was directly observed by the practitioner.

⇒ In modern systems, the fluorescent screen is coupled to an electronic device that amplifies and transforms the glowing light into a video signal suitable for presentation on an electronic display.

⇒ Fluoroscopy differs from most other x-ray imaging in that the

images produced appear in real-time allowing evaluation of dynamic biological processes and deciding interventions.

⇒ Electronic fluoroscopy systems create this perception by capturing and displaying images at a high frame rates typically 25 or 30 frames per second.

⇒ At these frame rates, the human visual system cannot distinguish frame-to frame rates, the human visual system.

Function :—

⇒ Digital fluoroscopy is currently most commonly configured as a conventional fluoroscopy system.

⇒ This method uses digital detector technologies (eg, flat, panel direct detection of x-ray and charg-coupled device technology)

⇒ The analog video singal is converted to a digital format with an analog to digital conveter (ADC).

Answer No: 02

Four Prime exposure factors :-

(1) **Kilovolt peak** (kvp)

kvp controls screen-film radiographic contrast

beam Penetrability.

The kvp has more effect than any other factor on image receptor exposure, kvp increase, less differential occurs. Therefore high kvp results in reduced image contrast.

(2) **Milliamperes**

The mA selected determines the number of x-rays produced, and therefore the radiation quantity.

As more electrons flow through the x-ray tube, more x-rays are produced with a constant exposure time. mA controls the x-ray quantity and therefore the patient radiation dose.

x-ray quality remains fixed with a change in mA.
A change in mA does not change the kinetic energy of electrons flowing from cathode to anode. it simply changes the number of elections

(3) **Exposure Time**

Radiographic exposure time usually are kept as short as possible. The Purpose is not to minimize patient radiation dose but rather to minimize motion blur that can occure because of patient motion.

(4) **Distance**

Distance has no effect on radiation quality Distance (SID) affects O.D.

Answer No: 03

Image quality factors :-

⇒ The overall blackness of the image is referred to as the radiographic density or optical density (OD). When the radiographic density is optimum, the image is both dark enough for you to see the anatomic details clearly on the viewbox.

⇒ An increase or decrease in exposure can only be detected by looking at the exposure indicator number.

Radiographic Contrast :-

⇒ The difference in the optical density of adjacent structure within the image is referred to as the radiographic contrast.

Kilovoltage :-

⇒ is the primary contrast control factor but radiographic contrast in influenced by a number of the other factors as well.

Image Detail :—

⇒ The third element of image quality is image detail.

⇒ This refers to the sharpness of the image.

⇒ when detail is high, the edges and lines that make up the image are crips and precise. With low detail, these lines and edges are less distinct and appear somewhat blurred or out of focus.

Distortion :—

The fourth element of image quality is distortion.

⇒ This refers to a variation in size or shap of the image in comparison to the object in represe

Shape Distortion :—

⇒ Shap distortion is t result of unequal magnification of various parts of the subject.

Influence the charateristics of a radiograph:—

Image quality is not a single factor but is composite of at least five factors. contrast blur noise, artifacts and distortion as shown above. The relationships between image quality factors and Imaging system variables. The human body contains many structures and objects that are simultaneously imaged by most imaging methods. The degree of contrast in the image depends on characteristics of both the object and the imaging system.

Answer No: 04

Image Intensifier

★ The Image - Intensifier tube is a complex electronic device that receives the image - forming x-ray beam and converts it into a visible - light image of high intensity.

★ The tube components are contained within a glass or metal envelope that provides structural support but more importantly maintains a vacuum

★ When installed, the tube is mounted inside a metal container to protect it from rough handing and breakage.

★ When an x-rays interacts with the input phosphor, its energy is converted into visible light.

* The Image - intensifier tube is approximately 50 cm long.

* A potential difference of about 25,000 V is maintained across the tube between photocathode and anode so that electrons produced by photoemission will be accelerated to the anode.

* The anode is circular plate with a hole in the middle through which electrons pass to the out put Phosphor,

* which is just the other side of the anode and is usually made of Zinc cadmium sulfide.

* The output Phosphor is the site where electrons interact and produce light.

Answer No: 05

a:-

Flat Panel Image Receptor

The Further improvment of DF Imaging is developing the Flat panel image receptor (FPiR)

Such an image receptor is composed of cesium iodide (csi)/ amorphous silicon (a-si) pixels. The FPiR is much smaller and lighter and is manipulated more easily than an image intensifier Flat-Panel detectors are more sensitive and faster then Film Their sensitivity allows a lower dose of radiation for a give picture quality than Film.

At tubes were replaced by CCD, now, CCD will be by FPiRS.

FPiRS is smaller, lighter and manipulated more easily it provides easy manipulation of Patient, radiologist radiographer No cassette is required.

b:-

charge coupled device

CCD is a device for the movement of electrical charge usually from within the device to an area where the charge can be manipulated, for example conversion into a digital value.

Properties:

→ Fundamentally a charge coupled device (CCD) is an integrated circuit etched onto a silicon surface forming light sensitive elements called pixels. photons incident on this surface generate charge that can be read by electronics and turned into a digital copy of the light pattern falling on the device.