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Paper Radiation Protection
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Date 22-06-2020
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Q1:→ Defferentiate b/w Deterministic and Stochastic effects of Radiation:→

Ans The deterministic and Stochastic effect of radiation difference is given below.

	Deterministic	Stochastic effects:→
①	The deterministic has no thereshold levels of Radiation dose.	① Has no threshold Radiation dose
②	Thiss occur at the level of tissue.	② This occurs at the level of cell.
③	A latent period is seen b/w the time of exposure and the events to manifest.	③ A latent period is seen b/w the time of exposure and the events to manifest.
④	Severity may be proportional to the dose recieved.	④ Severity independent of dose recieved.

	Deterministic	Stochastic effect:-
(5)	Acute radiation syndrome Sterilty, Cataract.	(5) Maligancies; mutations + teratogenic effects.
(6)	Seen when the cell are killed or Loose to devide.	(6) Seen when the cell are modified rather than killed.
(7)	Worsening of the effect increase over the thresthold.	(7) They increase in likehood ase dose increase.
(8)	Lethal DNA Demage	(8) Non lethal demage.
(9)	Cell death.	(9) Gene mutation.
(10)	Killing of many cells.	(10) Sublethal Demage to DNA.

Q2:→ Explain the following, Radiation, Radioactivity, non ionizing, ionizing Radiation and harmful effects of Radiation?

Ans **Radiation:→** Energy that emitted from a source is reffered as Radiation. Radiation is energy that travels through the Spacey Can be defined as the energy released in the form of particles.

It is in the form of Subatomic particles and rays.

OR:→ The emission of energy as electromagnatic wave or moving Subatomic particle.

(B) **Radioactivity:→**

Radioactivity is the Spontaneous emission of radiation in the form of particles

or high energy photons resulting from a nuclear reaction.

↳ Some atoms exist in abnormally excited State Characterized by unstable nuclei, to reach Stability the nucleus Spantenously emits particles and energy and transfer itself into another atom, this process as known by radioactivity.

↳ We also says that the radioactivity is the Spantenous emission of particles and energy in order to become Stable.

3 **Ionizing Radiation:→** The type of Radiation which is high energy radiation is called ionizing radiation. This is very high energy radiation.

It is dangrous and leave

bad Impact on human body.
Alpha, Beta, x-ray are the examples of Ionization radiation.
It is very high energy and displace electron from there orbit.
Creating Charge atom and Created DNA demage.

④ Non-Ionizing Radiation:-

This type of Radiation is low energy radiation.
No ion Charge are produce in this reaction.
Microwaves, Radio frequency waves are the examples of non ionizing Radiation.
These rays are not directly harmful impact on our lives.
These are low energy radiation not enough energy to pull electon from orbit but

excite the electron.

(5) Harmful effects of Radiations:→

(a) Somatic effect:→

↳ In Somatic effect Demage to all parts of the body except the reproductive organs.

Symptoms:→

Hairloss, Fatigue, vomiting Skin burn, infertility in men, and leukmia.

(b) Genetic effect:→

Harmful genetic effect of radiation demage to reproductive cells, Genetic deject can be passed down the next generation, Down Syndrome, Klinfelter Syndrome Turner Syndrome.

Q3:→ Write two basic principles of Radiation protection:?

Ans The two basic principles for Radiation protection is given below.

(1) **Time:→**

To individual the close is directly releated to the duration of time. The exposure will be doubled if the time is doubled.

Keep the time of exposure to radiation as short as possible.

The time of exposure is kept minimum to reduce the motion blure.

The more radiation time, the more will the radiation exposure → to the pain physician. Therefore it is important to kept the time

minimum.
For Reducing the usage time the physician has to improve skill in intervention.

Distance:→

A greater distance from the radiation source can reduce radiation exposure.
if the distance b/w the source of radiation and the person increases, radiation exposure decreases rapidly. The amount of radiation exposure is not inversly propotional to the distance from the radiation source but it is inversly propotional to the square of the distance. Therefore maintain a greater distance from the x-ray generator is a very effective method for

radiation Safety.

"B" Radiation protectim Devices:⇒

1) Radiation protection Aprons.
2) Radiation protection Apron Accessories.
3) Radiation protection gloves.
4) Radiation protection glasses.
5) Radiation protection Apron Racks.
6) Radiation protection Thyroid Shields.
7) Radiation protectim Barrier and table shield.
8) Radiation protection Drape Shields.
9) patient Radiatim protection.
10) veterinary Radiation protectim.

Q4:→ What are the feature for Radiation protection design? Explain?

Ans The features for Radiation protection design is given below.

① protective x-ray Tube Housing:→

Leakage radiation must be less than 1mGy./hr.

↳ All the x-ray tube must be Contained within a protective housing that Can reduces leakage radiation during use.

② Control Panel:→

The Control panel must indicate the conditions of exposure and must positively indicate when the x-ray tube is energized.

(3) Source to image Receptor distance:→
There Should be a Source to image receptor indicator must be provided. This may be as simple as like tape measure or as advanced as lesser.

(4) Collimation:→
There Should be collimator as provided for the Special eximanation. This is useful for the good and detail image of a particular part.

(5) positive Beam limitation:→
The positive beam limitation devices are not longer required but continued to be a part of most new radiographic imaging System.

(6) Beam Alignment:→

With having a proper Collimation each tube Should having ensure proper alignment of the x-ray beam and the image receptor.

(7) Filtration:→

All purpose x-rays beam must have a total filtration of at least 2.5 mm Al. For a good radiography filtration is very necessary.

(8) operator Shield:→

It must not be possible to expose an image receptors, while Stand unprotected outside a fixed protective barrier usually the Console booth.

(9) Mobile x-ray Imaging System?

For each mobile x-ray imaging System a protective lead apron Should be Assigned. The exposure switch of such imaging System allow the operator at two (2m) from the x-ray tube during the exposure.

Q5 What is GM Counter? how it can be used as a radiation protective device?

Ans

Geiger - Muller Counter:→

The Geiger - Mullar Counter is a gas filled dectector designed for maximum gas amplification effect.

↳ The Centre wire is maintained at a high positive voltage relative to the outer cylindrical electrode. The outer electrode may be metal cylinder.

↳ Some GM Counter have a thin radiation entrance windows at one end of the tube.

The cylinder of the tube is sealed and filled with a special gas mixture.

↳ When ionization occur in GM Counter electron are accelerated toward the Center wire. Gas amplification occur in the GM counter as in a propotional Counter.

↳ The avalanche progresses, the electrons being relatively light are quickly collected but the heavy slow moving positive ion are not.

↳ The avalenche ionization in GM tube release a large and essential Constant quantity of electrical Charge, regardless of voltage applied to the tube.

↳ Commonly used quenching gases include heavy organic vapors and halogen gases.

"B" "GM Counter used as rad protection Device"

"B" GM survey meter are widely used at very low radiation level.

↳ They are particularly

applicable for leak testing and detection of radioactive Contammination.

↳ GM Counter exhibit Strong energy dependence at low photon energies and are not sutiable for used in pulsed radiation fields.

↳ They are considerd indicators of radiation.

Fig 1:→ Geiger Mullar - Counter
Fig 2:→ Geiger Mullar - Counter work.

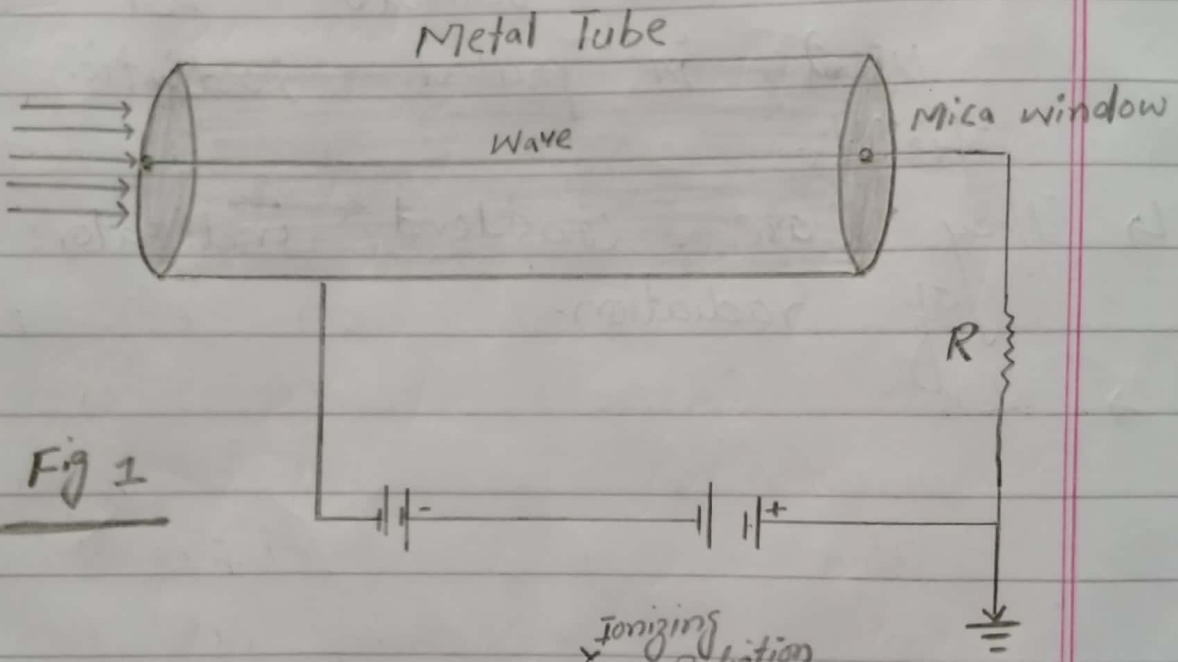

Fig 1

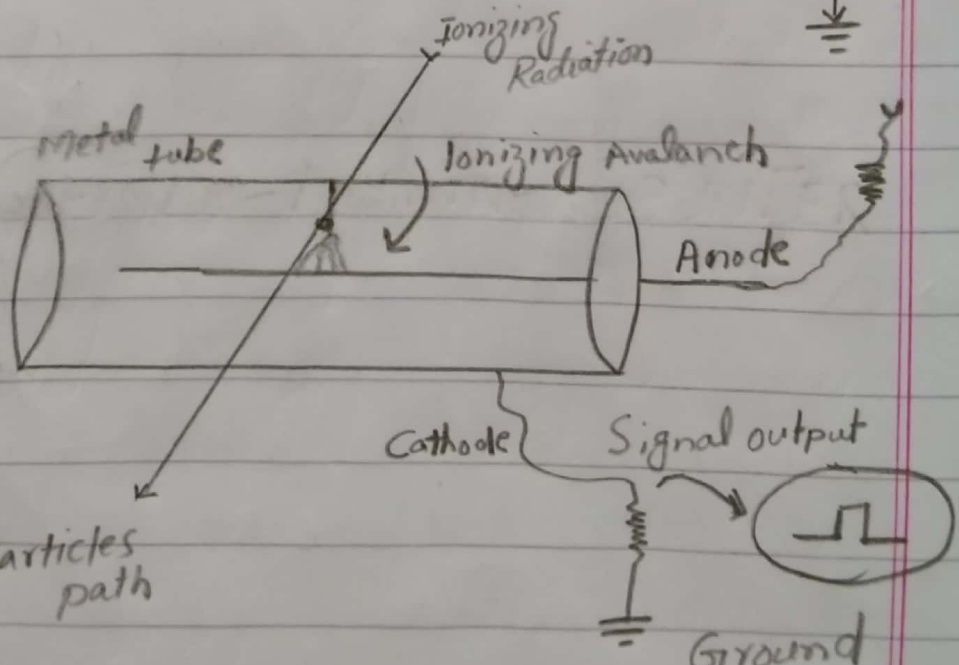

Fig 2