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Q=1 Differentiate B/w deterministic & Stochastic effect of radiation?

1 Stochastic Radiation:-

∴ → Have no threshold levels of radiation dose
∴ → The Probability of the effects is proportional to the dose.
∴ → A latent period is seen Between the time of exposure & the events to manifest.
∴ → Several independent of dose recieved
∴ → Seen when the cells are modified rather than killed.

2:- Deterministic:~

↳ Have ~~different~~ definite threshold levels of radiation dose.

↳ The Probablity of the effects is proportiond to the dose.

↳ A latent Period is seen between the time of exposure & the events to manifest

↳ Severity may be proportional to the dose recieved.

↳ Seen when the cells ase killed or loose Capability to divide.

P.T.O

Q=2 Explain briefly following terms radiation, radioactivity, non-ionizing radiation, ionizing radiation & harmful radiation?

1:- Radiation:-

The ~~energy~~ emission of energy as electromagnetic waves or as moving subatomic particles especially high energy particles which cause ionization.

2:- Radioactivity:-

is the spontaneous emission of radiation in the form of particles or high energy photon resulting from a nuclear reaction.... A substance that contain unstable atomic nuclei is considered to be radioactive. Radioactive decay is a random or stochastic process of that occur at the level of individual atoms.

P.T.O

3:- Non ionizing Radiation:-

Non ionizing radiation refers to any type of electromagnetic radiation that does not carry enough energy per quantum to ionize atoms or molecules-. that is, to Complete remove an electron from an atom or molecule.

4:- Ionizing Radiation:-

Ionizing radiation is a type of energy released by atoms in the form of electromagnetic waves or particles - People ase exposed to natural Sources of ionizing radiation, Such as in soil, water, & vegetation, as well as in homan made Sources, Such as x-rays and medical devices.

5:- Harmful Radiation:-

Radiation damages the cells that make up the human body. low levels of radiation are not dangerous, but medium levels can lead to Sickness headaches, vomiting

Q a fever, High levels Can kill you by Causing damages to your internal organs - It's difficult to treat high radiation exposure.

Q-3:- a) Write two basic principle of radiation Protection.
b) write down the names of the radiation protection devices.

(a) The Principle of radiation protection and Safety on which the Standards are based are those developed by the ICPR (International Commission on Radiological Protection) and by INSAG (International Nuclear Safety Advisory Group) From the Hazard of ionizing radiation are Summarised as three key words.

1:- Justification
2:- optimization.
3:- Dose limit

1) Justification:-

Any decision that alters the radiation exposure situation should do more good than harm.

2) Optimization:-

The likelihood of incurring exposures the number of people exposed & the magnitude of their individuals doses should all be kept as low as reasonably achievable (ALARA) taking into account economic & Societal factors.

3) Limitation of dose:-

The total dose to any individuals from regulated sources in planned exposure situation other than medical exposure of patients should not exceed the appropriate limits recommended by the "ICPR".

P.T.O

B):- 1:- Radiation Protection aprons.

2:- Radiation Protection apron Accessories.

3:- Radiation protection Gloves.

4:- Radiation Protection Glasses

5:- Radiation Protection thyroid shields.

6:- Radiation Protection Apron Racks.

7:- Radiation Protection Barriers & table Shield.

8:- Radiation protection Drape shield.

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Q:4 What are features of radiation protection design? Explain Briefly.

1:- Facility Design Features:-

Specific design features for maintaining personal exposure as low as

Reasonably achievable (ALARA) are presented in this subsection. The design feature recommendation given in Regulatory Guide 8.8 are utilized to minimize exposure to personnel.

"OR"

Many Radiation protection devices and accessories are associated with modern x-rays imaging system. Two that are appropriate for all diagnostic x-ray tube and to the control panel.

* Protective x-ray tube Housing:-

Every x-ray tube must be Contained within a protective housing that reduce leakage radiation during use.

∴ leakage radiation must be less than 1 mGy/hr (100 mR/hr) at a distance of 1m from the proctective housing" ∴

* Control pannel:-

The Control pannel must indicate the conditions of exposure & must positively indicate when the x-ray tube is energized. These requirements are usually satisfied with the use of KVP & mA indicators Sometimes, visible or audible signals indicate when the x-ray beam is energized.

∴ x ray Beam on must be positively & clearly indicated to the radiologic technologist ∴

* Source to image Receptors Distance Indicator (SID):-

A Source to image Receptors distance (SID) indicator must be provided - This Can be as a tape measure attached to the tube housing, or as advanced as lasers.

∴ The SID indicater must be accurate to within 2% of the indicated SID ∴

* Collimation: →

Light localized, variable aperature rectangular collimation should be provided. Cones & diaphragm may Replaces to the collimator for special examination - Attenuation of the useful Beam by collimators shutters must be equilant to attenuation by the protective Housing.

∴ The xray Beam & the Light Beam must Coincide to with in 2% of the SID ∴

Q-5 what is GM Counter. how it can be used as a radiation protection device.

A Gieger Counter :- Gieger muller tube is a device used for the detection & measurement of All types of radiation: alpha, beta, & gamma radiation. Basically it consist of pair of electrodes sorrounding by a Gas - The electrode have a high voltage across them - The Gas used is usually Helium or Argon.

∴ GM Counter limited to 1 mGy/hr portable — Survey for low radiation levels & radioactive collimation. ∴

The Forth region of the voltage response curve for the ideal gas - filled chamber is the Geiger - muller region. This is the region in which Geiger Counter operate.

In the G-M region the voltage across the ionization chamber is sufficiently high that when a single ionization event occur- a cascade of secondary electrons is produced in a fashion similar to a very brief, yet violent Chain Reaction.

Gieger Counter are used for Contamination Control in nuclear medicine & labortries - Gieger Counter are sensitive instrument that are capable of detecting & indicating single ionizing events. The Gieger Counter does not have a very wide range - Most instruments are limited to less than 1mGy/hr (100mR/hr)

The End