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Paper Radiation protection.
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Q:-1:- Deform Differeniate between determinivtic and Stochastic effect of radiation.

→ Deterministics effects of Radiation:→

Deterministic radiation responses are those that exhibit increasing severity with increasing radiation dose.

→ there is a dose threshold, and the dose-response relationship is non-linear.

→ these early effects have been studied extensively with laboratory animals and some data have been obtained from observation of humans.

P.T.O.

within a ...
This Immediate response is called deterministic effect.
They are produced by high radiation doses delivered over a short time period

Stochastic effects of radiation :→

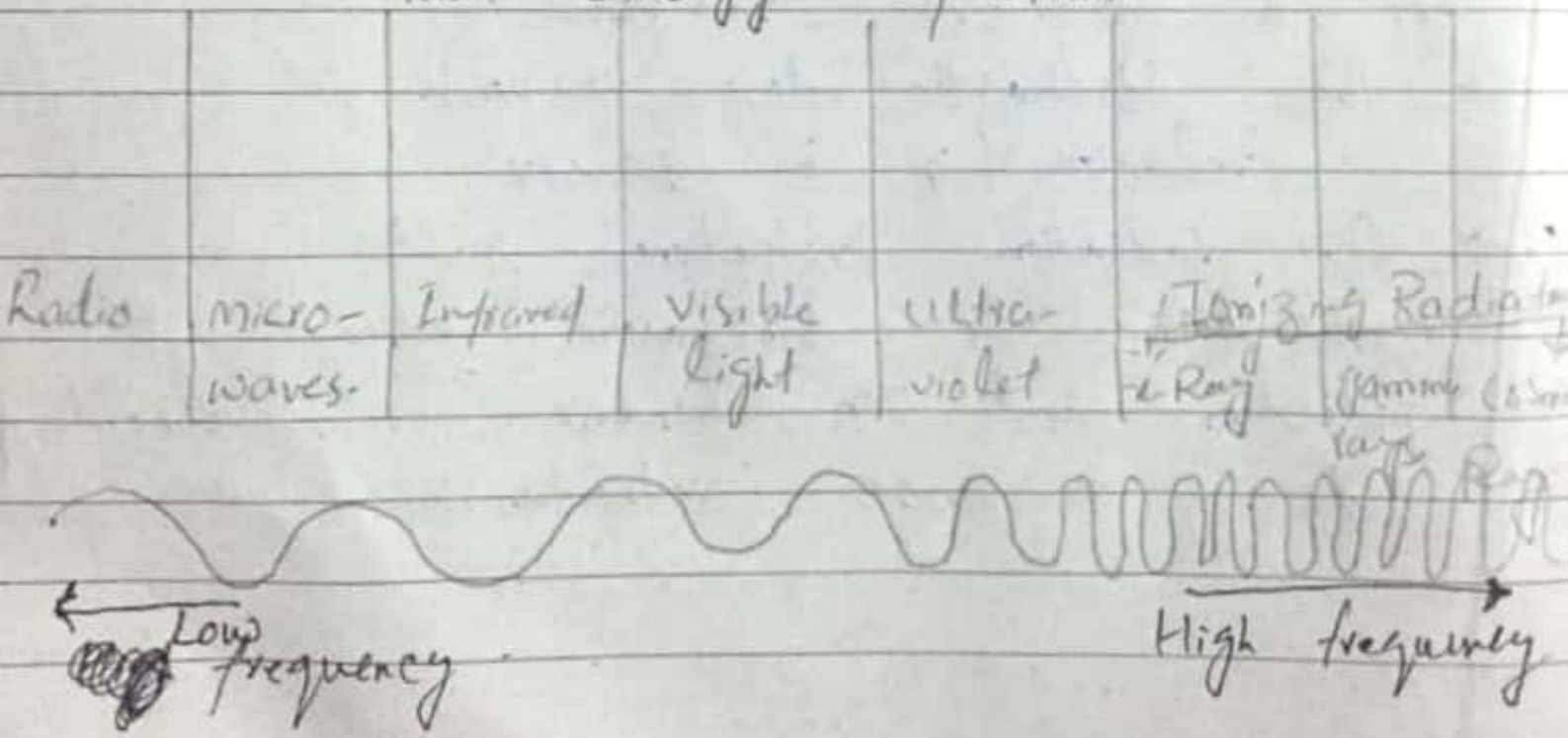
Stochastic effects of radiation exposure are the result of low doses delivered over a long time period.
If the incidence of the radiation response increases with increasing radiation dose, it is called stochastic effect of radiation.
⇒ Radiation exposure experienced by personnel in diagnostic imaging are low a dose and low linear energy transfer. (LET).
The radiation exposures that we experience in diagnostic radiology

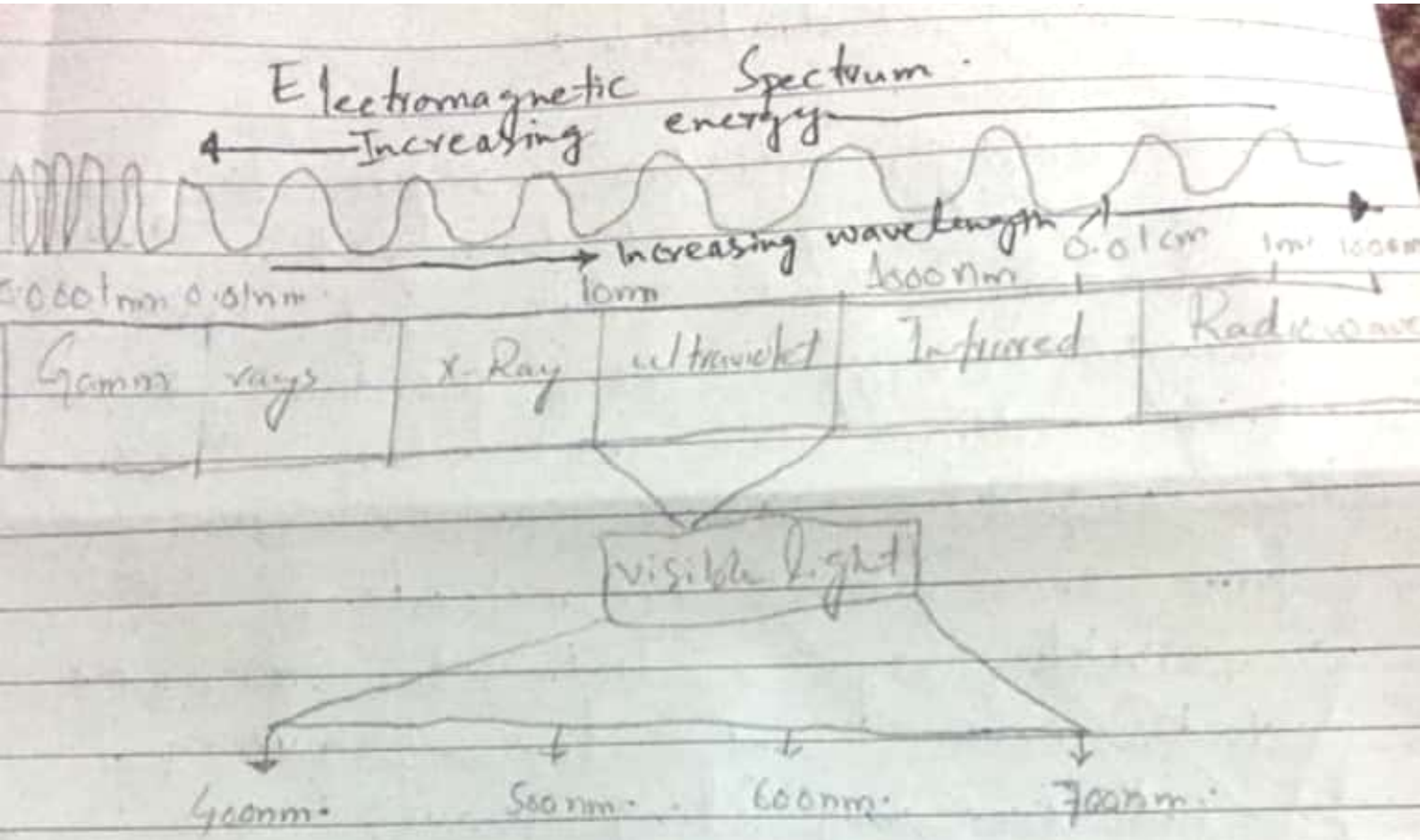
Q 2:. Explain briefly the following terms. Radiation. Radioactivity, non-Ionizing radiation and harmful radiation.

Radiation:→

Energy emitted and transfered through Space is called radiation. Radiation is the transfer of energy.

The Energy Spectrum.





Radio Activity :→

Radioactivity is the spontenous emission of particles and energy in order to become stable.

Non- Ionizing Radiation :→

Non- Ionizing radiation refers to any type of electromagnetic radiation that does not carry enough energy per quantum to Ionize atom or molecules. that is to completely remove an electron from an atom or molecule.

→ visible light, Infrared, microwave radio waves, and low- frequency radio-frequency (long- wave) are all examples of non- Ionizing radiation.

Harmful Radiation :→

Gamma rays are the most harmful external Hazard. Beta particles Can Partially Penetrates Skin, Causing 'beta burns'. Alpha particles Can not Pentrate Intact Skin.

Q. 3 (a) Two basic Principles of radiation protection

(1) Minimize time :→

The dose to an individual is directly related to the duration of radiation of exposure

→ If the time during which one is exposed to radiation is doubled the exposure will be double.

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

→ During radiography, the time of exposure is kept to a minimum to reduce motion blur.

→ During fluroscopy, the time of exposure also should kept to a minimum to reduce patient radiation exposure.

③ Maximize Distance :-

→ Maintain as large a distance as possible between the source of radiation and exposed person.

→ As the distance between the source of radiation and the person increases, radiation exposure decreases rapidly.

→ If the distance from the source exceeds five times the sour diameter. It can be treated as point source.

→ Most radiation sources are point sources. The x-Ray tube target, for example, is a point source of radiation.

→ The square law was used as to calculate exposure in radiographic technique.

$$\frac{\text{New exposure}}{\text{old exposure}} = \frac{\text{old distance Squred}}{\text{New distance Squared.}}$$

protection Procedure.
The technologist should remain as far from the patient as practicab

Q-3 (B)

Radiation Protection devices

- Radiation protection Aprons.
- Radiation Protection Asseccories.
- Radiation Protection Gloves.
- Radiation protection Glasses.
- Radiation protection thiyroids Shields.
- Radiation Protection Apron Racks.
- Radiation protection Apron Racks and Drap shields.

② Control Panel.

The control panel must Indicate the condition of exposure and must positively indicate when the x-Ray tube is energised.

→ The x-Ray beam on must be positively and clearly indicated to the radiologic technologist.

3) Source-to-Image Receptor Distance Indicator:→

A Source-to-Image receptor distance (SID) indicator must be provided.

→ This can be as a tape measure attached to the tube housing.

→ The SID Indicator must be accurate to within 2% of the indicated SID

④ Collimation:→

light localized, variable aperture rectangular collimator should be provided.

of the SID.

⑤ Positive - Beam limitation :→

Automatic, localized, variable - aperature collimator were required on all but Special x-Ray Imaging System manfuctured In the united states between 1974 and 1994.

→ These positive - beam limiting (PBL) devices are no longer required but Continue to be a part of most new radiographic Imaging System.

→ The PBL must be accurate to within 2% of the SID.

⑥ Beam Alignment :→

To Proper collimation, each radiograph tube should be provided with a

Q-5

What is GM Counter.
How it can be used as Radiation protection device.

GM Tube Counter :→

Geiger Muller (GM) Counter is a gas-filled detector designed for maximum gas amplification effect.
The principle of a GM Counter is
The center wire (Anode) is maintained at a high positive voltage relative to the outer cylinderical (electrode cathode).
→ The outer electrode may be a metal cylinder or a metallic film sprayed on the inside of a glass or plastic tube.
Some GM Counters have a thin radiation entrance window at one end of the tube. The cylinder of the tube is sealed and filled with a special gas mixture typically argon

Use of GM. Counter

Geiger-Muller Counters operate under even higher voltages between the anode and the cathode. Usually in the 800 to 1200 volt range. Like the proportional counter, the high voltage accelerates the charges produced in initial Ionization to where they have enough energy to Ionize other electron in the gas.

→ The collection of the large numbers of secondary Ions in the GM region is known as an avalanche and produce a large voltages plus.

→ The electric circuit of GM Counter Counts and records the number of pulses and the information is often displayed in counts per minute.

→ Geiger Counter are used for Contamination Control in nuclear medicine laboratories.