NAME = MARIA BANGASH
ID NO = 15237
Subject = Radiation protection
Submitted TO = Mam AFOOFA Azmat

Q NO:2) Explain the following terms.

* Radiation:- Emission and propagation of energy through space or through a material in the form of wave or by extension, corpuscular emission.

∴ Radioactivity:- Spontanous emission of radiation from the nucleus of an unstable atom.

∴ Non-Ionizing Radiation:-
Non-Ionizing Radiation does not contain sufficient energy to produce ions.

∴ Ionizing Radiation:- Particals or Photons with sufficient energy to produce ions in the medium.

∴ Harm Full Radiation:- Radiation damages the cells that make up the human body. Low level of radiation are not dangrous but High level can kill

by causing damages to your internal organs. It's difficult to treat high radiation exposure.

Q3) a) write two basic principles of radiation protection?

Time:D

- keeping the time station of X-ray machine to lowest possible numbers and the highest MA station in order to obtain the desired mAs when making exposure.

- Minimizing your time in the room during the exposure.

- Longer the time spent in the radiation field greate the exposure.

Distance:- The principle of distence means that there needs to be physical distance between technician and the patient/X-ray tube ,at the time of exposure.

- The exposure falls as a function of square of the distence from the radiation source

b) write down the names of the radiation protection device?

⇐: Radiation Protection Devices:-

- Radiation protection Aprons.
- Radiation protection Aprons Accessories.
- Radiation protection Gloves.
- Radiation protection Glasses
- Radiation protection Thyroid shields.
- Radiation protection Apron Racks
- Radiation protection Barriers and Table shields.
- Radiation protection Drape shields.
- Patient radiation protection.
- Veterinary Radiation Protection.

Q NO 4) What are features for radiation protection design? Explain briefly?

Ans) • Protective X-Ray tube housing.
⇒ protective housing to reduce leakage radiation.
• must be less than 100 mR/hr at a distance of 1m from protective housing.

• Control Panel:
• Must show exp conditions and when tube is energized.

- Beam ON must be clear to technicians.

- SID Indicator:
  - Indicator must be present.
  - Must be accurate within 2% of the indicated SID.

- Collimation.
  - Light field, variable aperture.
  - X-ray beam and light filed must coincide w/in 2% of SID

- PBL - positive Beam Limitation.
  - Auto collimation circa 1974-1994.
  - Must be accurate w/in 2% of SID.

- Beam Alignment:
  - How do we know the tube is aligned with the image receptor.

- Filtration:
  - Inherent plus added.
  - Total must be at least 2.5mm above 70 kvp.

- Reproducibility:
  - Constant output radiation intensity.
  - Should not exceed 5% through same technique.

- Linearity:
  - Constant output for varied mA settings while time is adjusted to keep mAs

the same.
- Max variation is 10% from one mA to adjusted mA station.

Q.No5) What is GM counter, how it can be used as a radiation protection device?

⇒ GM Counter:-
A Geiger counter is an instrument used for detecting and measuring ionizing radiation also known as a Geiger Muller counter, it is widely used in applications such as radiation dosimetry, radiological protection etc.
⇒ It detects ionizing radiation such as alpha, beta, gamma rays.
⇒ Geiger Muller tube is filled with an inert gas such as helium, neon or argon at low pressure to which a high voltage typically 400 - 600 V is applied.

* Principle of operation:-

1) When a single gamma or beta ray entering the tube, a small amount of ionization is produced.
2) The counter electrode which is at high positive potential attracts the electrons and give them energy to produce further ionization and

the whole volume contains ion pairs.

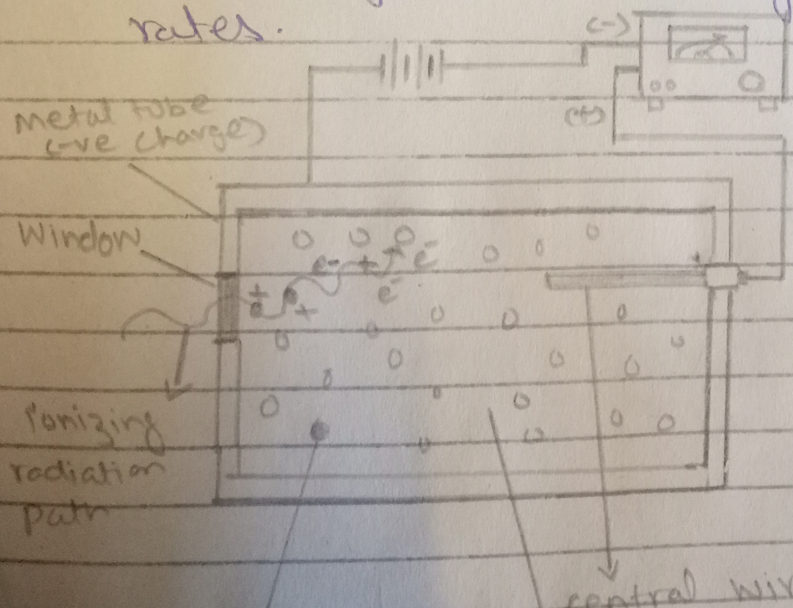
3) The electrons are rapidly collected

4) The voltage on the center electrode drops and the slow positive ions go to the outer wall.

5) After 400 μsec (Dead time) the tube is ready to repeat the process.

READ OUT :D

- "Counts per second".
- Radiation Dose "Sievert". normally measure gamma or x-rays dose rates.



1: GEIGER COUNTER :D

ionizing of fill gas takes place along track of radiation

QNO1) Differentiate between deterministic and stochastic effects of radiation.?

Radiation Effects

DETERMINISTIC Effect

- Mechanism is cell killing.
- Has a threshold dose
- Deterministic in nature
- severity increases with dose
- occures only at high doses.
- Can be completely avoided
- Causal relationship between radiation exposure and the effect.
- Sure to occur at an adequate dose.

STOCHASTIC Effect

- Mechanism is cell modification.
- Has no threshold.
- Probabilistic in nature.
- probability increases with dose.
- occurs at even low doses.
- cannot be completely avoided.
- Causal relationship cannot be established at low doses.
- occurs only among a small percentage of those exposed.