

Faculty of science

Diploma of Radiation physics

Physics department

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Experimental Radiation Physics final exam

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**Q1- State why these statements are true.**

- 1- Kinetic energy of fast ( $v/c > 0.6$ ) ionizing radiation is not  $1/2 mv^2$ .
- 2- Date of manufacture of radioisotope should be given.
- 3- Cannot use  $O_2$  in gas detectors.
- 4- Ci and Bq are two related units.
- 5- Co-60 emits  $\beta$  and gamma rays while Sr-90 emits only  $\beta$ .
- 6- Gamma rays have a discrete energy character.
- 7- Two sources of back ground radiation are present.
- 8- Origin of gamma ray and X- rays is different.
- 9- Ionization chamber can be used in energy determination.
- 10- No detectors can be used in regions  $< V_{\text{Ionization}} \text{ OR } > V_{\text{GM counter}}$ .
- 11- Exposure of humans to high fluxes of fast neutrons is dangerous.
- 12- Biological effect of same doses of alpha and gamma is different.
- 13- Types of electromagnetic radiations are two.
- 14- Dose and dose equivalent are different.
- 15- NaI (Tl) is preferable in gamma spectroscopy.

**Q2- Which ones are true and which are false, correct the false one**

- 1- Recombination in gas counter means combination of (e) and nuclei.
- 2- Rest mass of alpha and protons are equal.
- 3- Good shields are supposed to achieve small HVL.
- 4-  $de/dx$  equation can be applied to gamma rays.
- 5- Uv and X-rays are two types of ionizing radiations.
- 6- Neutrons interacts with matter via coulomb law.
- 7- Their a mass difference between  $\beta^+$  and  $\beta^-$ .

8- Only paraffin sheets are used as a neutron shield.

9- Types of ions in proportional counter are three.

10- Decay time of scintillator should be long.

**Q3- A- Complete the following sentences:**

1- Scintillation crystal converts gamma rays to .....

2- The function of Tl – dopant in scintillation to improve.....

3- As photon light strikes the photocathode ..... are emitted.

4- Neutrinos are only emitted in ..... decay.

5- Alphas interact with matter via ..... and ..... process.

6- Mobility of +ve ion is ..... than that of –ve ion.

7- Gas multiplication factor means .....

8- An activity  $A_0$  is reduced to ..... after  $4T$ .

9- Rest mass of U-235 is ..... MeV.

10- Saturation property in an ionization chamber is due to .....

B- **Experimentally**, how to determine the energy of unknown source using multi-channel analyzer MCA?

**Q4- A- Write briefly on the following:**

1- Decay Scheme.

2- Photomultiplier tube PMT.

**B- Solve the following problems:**

1- Find V/C ratio for 5 MeV alpha.

2- Using an ionization chamber, if the resulted pulse amplitude 0.05mV and equivalent capacitance 0.1 pF. Find the number of ion pairs produced

3- How much energy is absorbed in a person (mass = 75 Kg) who exposed to 45 mrem alphas ( $Q_\alpha = 20$ ).

4- Prove that  $\mu_1 = \ln 2 / x_{1/2}$

**BEST WISHES**

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