**University of Salahaddin Subject: Radiation Dosimetry II**

**College of Education / Shaqlawa Stage: Fourth**

**Department: Physics Duration: 2 Hours**

 **Date: / /2024**

**Final Examination (2023-2024) First Semester, ( ) Round**

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**Q1- Choose the correct answer for the following: [20 Marks]**

**1.**The unit of energy fluence rate is\_\_\_\_\_\_\_\_\_\_.

 a. J·m–2/s b. J·m–2·s c.J·m.2·s–1 d. J/m–2·s–1

**2.** The exposure constant is characteristic for the\_\_\_\_\_\_\_\_\_\_\_\_.

 a. material interaction b. radiation source

 c. both of them d. not given

**3.** \_\_\_\_\_\_\_\_\_\_\_\_Dose from standard radiation to produce a given biological effect over Dose from test radiation to produce the same biological effect.

 a. LET b. RBE c. DRC d. DF

**4.** When radiation interacts with water, the water is ionized, producing\_\_\_\_\_\_\_\_\_\_\_.

 a. OH- b. OH+  c. HOH+ d. HOH-

**5.**\_\_\_\_\_\_\_\_is similar to skin effects and can occur after acute doses of about 400 rad.

 a. Hair loss b. Sterility c. Erythema d. not given

**6.** Cells that generally have a \_\_\_\_\_oxygen state is less responsive to radiation than are cells at \_\_\_\_oxygen state.

 a. low, high b. high, low c. low, low d. high, high

**7.** The OER for alpha particles is equal to\_\_\_\_\_\_\_\_\_\_\_.

 a.3 b. 2.5 c.1.6 d.1

**8.** the \_\_\_\_\_\_\_\_\_\_cells were one of the most sensitive cells to radiation due to their rapid regeneration rate.

 a. Skin b. Brain c. Muscle d. Blood

**9.** Which of the following diseases can be regarded as a stochastic effect due to ionizing radiation?

 a. reduction in the number of white blood corpuscles b. leukaemia

 c. temporary sterility d. permanent sterility

**10**. The unit of the collective effective dose is:

 a. Rad. b. R. c. Gy. d. Sv.

Q2/ The diagram below shows the energy deposited in a small volume (V). The energy losses are shown by lines, and you can find the following: **[9 marks]**

1. Determine the energy transfer.
2. Determine the net energy transfer.
3. Determine the energy imparted.

$hν\_{1}=0.4 MeV$

$$hν\_{2}=5 MeV$$

$$0.6 MeV$$

$$1.022 MeV$$

**Q3/ A:** The fluence rate of 6 MeV Gamma ray is (3.4x106 ph /cm2.sec) at a point in Pb, what are the values of K and Kcol there after one week?

 $(\frac{μ\_{en}}{ρ})\_{6 Mev}^{pb}=0.0272 cm^{2}/g , (\frac{μ\_{tr}}{ρ})\_{6 Mev}^{pb}=0.0331 cm^{2}/g $ **[6 Marks]**

**B:** Compare between Stochastic and deterministic effect, after that show that by figure. **[7 Marks]**

**Q4/ A:** During the year a worker receives 8 mGy from internally deposited alpha particle in the lung, 180 mGy from beta particles in the thyroid, and 14 mGy externally from uniform wholebody irradiation. What is the effective dose for this worker? Note: $Q\_{alpha}=18, Q\_{beta}=1$, $w\_{lung}=0.12,w\_{thyroid}=0.05, w\_{whole body}=1$. **[6 marks]**

**B:** What is the (Kc)air in Gy at appoint in air where X= 47 R ($\frac{W\_{air}}{e}=33.97 J/C)$ ? **[6 marks]**

**C:** Write Effects of Exposure to Low Doses of Radiation and explain one of them. **[6 marks]**

 **Good Luck**

 **Instructor’s Name**: **Dr. Hallo Mahmud Kaka Signature:**