

Post M.Sc Diploma in Radiological Physics Examination July 2016**Radiation Dosimetry and Standardisation**

Time: 3 hours

Maximum Marks: 100

- Answer all questions
- Use of Calculators/physical and mathematical tables permitted.

Essays**(2x14 = 28)**

1. Describe with neat diagram how exposure is measured using free air ionization chamber. Why it is difficult to measure exposure in roentgen for beam energy greater than 3 MeV
If the radiation level at appoint 'A' from Ir-192 source is 40 mR/hr. If the operator moves 10m away from point 'A', the radiation level decrease to 10 mR/hr. What is the activity of the source used (9+5 = 14)
2. Briefly explain Brag-Gray cavity theory and explain the two corollaries of Brag-Gray cavity.
Alpha source of 100 Bq (i.e 100 dps) activity and 6 MeV energy is kept inside the gas filled detector. If all the particles completely absorb their energy inside the detector, calculate the average current from the detector (take 30 eV is the average energy required for one electron ion pair and unit electric charge is 1.6×10^{-9} C) (9+5 = 14)

Short Essays**(4 x 8 = 32)**

3. Apparent activity and standardization of HDR Ir-192 source.
4. Comparison of TRS 398 and TG 51 protocols.
5. Detailed explanation on how neutrons of different energies interact with tissue
6. Relationship between Kerma, absorbed dose and exposure under CPE

Short Notes**(10 x 4 = 40)**

7. Standardization of I-125 source
8. Mass energy transfer and mass energy absorption coefficients
9. Cyclotron produced isotopes
10. Thermal and fast neutron sources
11. Requirements for an ideal chemical dosimeter
12. Neutron yield and fluence rate measurements
13. Standardization of gamma emitters with scintillation spectrometers
14. Free radicals and G-value
15. Beer-Lambert's law
16. Radiation chemistry of water and aqueous solutions
