

**Post M.Sc Diploma in Radiological Physics Regular/Supplementary  
Examinations October 2019**

**Radiation Dosimetry and Standardisation**

Time: 3 hours

Max. Marks: 100

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

**Essays**

**(2x14=28)**

1. Define specific gamma ray constant and derive an expression for the same. Calculate the rise in temperature when absorbed dose of 1Gy is deposited in 1Kg of H<sub>2</sub>O, assume that the specific heat capacity of water is 4200 J/kg.K  
(9+5)
2. Explain how the Ir<sup>192</sup> source is standardized using well type ionization chamber. Explain different correction factors involved in this procedure. In a cylindrical counter, a voltage of 200V is applied with a = 0.008 cm (anode wire radius) and b = 1.0 cm (cathode inner radius). What is the electric field at the anode surface. Further if the counter is of parallel plate geometry with the same spacing (1.0cm), what applied voltage would be required to achieve the same electric field.  
(9+5)

**Short Essays**

**(4x8=32)**

3. Radiochemistry of water
4. IAEA TRS-277
5. Interaction of neutrons of different energies tissue
6. Bragg-Gray principle and its derivation

**Short Notes**

**(10x4=40)**

7. Transient charged particle equilibrium
8. Primary standard and secondary standard
9. Linear and mass attenuation coefficients
10. Cyclotron produced isotopes
11. Thermal and fast neutron sources
12. Reference air Kerma rate and air Kerma strength
13. Precision long counter
14. Extrapolation chamber
15. FBX dosimeter
16. Applications of chemical dosimeters in radiotherapy

\*\*\*\*\*