QP Code: 105391 **Reg. No.....**

Post M.Sc Diploma in Radiological Physics Regular/Supplementary Examinations October 2023

Radiation Dosimetry and Standardisation

Time: 3 hours **Max. Marks: 100**

- ***Answer all questions to the point neatly and legibly • Do not leave any blank pages between answers • Indicate the question number correctly for the answer in the margin space***
- ***Answer all parts of a single question together • Leave sufficient space between answers***
- ***Use of Calculators/physical and mathematical tables permitted*.**

Essays **(2x14=28)**

1. a) Define specific gamma ray constant and derive an expression for the same.
   b) Calculate the rise in temperature when an absorbed dose of 2Gy is deposited in 1Kg of water. Assume that the specific heat capacity of water is 4200 J/Kg.K
   (9+5)
2. a) Describe in detail about the measurement of absorbed dose to water for high energy photon beam using TRS398 protocol
   b) Find the absorbed dose to water at dmax for high energy photon beam if the average meter reading for 200MU at 10cm depth is 28.20 nC. N D,W = 4.836x107Gy/C, KQ = 0.9957, T=21o C, P= 1007 mbar, M+ = 28.26 nC, M- = 28.3 nC, M1(for 300V) = 28.26nC, M2(for 100V) = 28.05 nC, PDD 10cm = 66.07. (Given, a1 = -0.1875, a2 = 0.677) (9+5)

Short Essays **(4x8=32)**

3. Explain how neutron flux is measured using activation method and absorption method
4. Explain the Bragg-Gray principle and its derivation
5. Define briefly Absorbed dose, Kerma and Exposure. Derive the relationship between then under charged particle equilibrium.
6. Describe Fricke dosimeter and its application in radiotherapy

Short Notes **(10x4=40)**

7. Beta-Gamma coincidence counting
8. Transient charged particle equilibrium
9. Extrapolation chamber
10. Primary standard and secondary standard
11. Thermal and fast neutron sources
12. Radiation Polymerisation
13. Radiation chemical yield
14. Beta ray applicator
15. Reactor produced isotopes
16. 4Π counting

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