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

Post M.Sc Diploma in Radiological Physics Regular/Supplementary Examinations October 2024

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) Explain chemical dosimeters, its requirements and salient features. Explain in detail about how a Fricke dosimeter is used to measure absorbed dose.
   b) A Fricke dosimeter was irradiated in Co-60 gamma chamber for 10 minutes. On spectrometer measurement using 0.01m optical cell at 304nm the absorbance of the solution was found to change from 0.007 to 0.548. Calculate the dose rate of gamma chamber at that position (G(Fe+3) = 352 X 10 -6 m2J-1, ρ = 1024 kgm-3, irradiation temp = 27.80C, measurement temp = 26.10C) (9+5)
2. a) Explain how the Ir-192 source is standardised using well type ionisation chamber. Explain different correction factors involved in the procedure
   b) In a cylindrical counter, a voltage of 300V is applied with a= 0.008cm (anode wire radius) and b= 1.0 cm (cathode inner radius). What will be the electric field at the anode surface. 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. Explain the various correction factors used in finding the output of a linac based on TRS 398
4. How is neutron flux measured by (n,γ) and (n,p) reactions.
5. Explain the steps involved in the cross calibration of therapy dosimeters
6. Define specific gamma ray constant and derive an expression for the same

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

7. Charged particle equilibrium
8. Natural and artificial radioactive sources
9. Ambient and directional dose equivalent
10. Molar absorption coefficient
11. Advantage and disadvantages of the definition of roentgen
12. Reference air kerma rate and air kerma strength
13. Cyclotron produced isotopes
14. Neutron yield
15. Timer error in telecobalt unit
16. Dead time correction in a counting system

****