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

# Post M.Sc Diploma in Radiological Physics Supplementary Examinations March (October), 2020

## 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. • Explain in detail how the Output (Dw) of a telecobalt machine can be measure using TRS 398 protocol.
   • Calculate the dose rate in Gy/min for an average electrometer reading of 30 nC for a set machine time of 3 minutes in a telecobalt machine ($T_1$= 22ºC, $T_2$ = 22.2ºC, $P_1$=1007 mbar, $P_2$ = 1010 mbar, τ = 0.02min, $N_{DW}$ = 4.83 x $10^7$ Gy/C at 20ºC and 1013.2 mbar) (9+5)
2. • Explain chemical dosimeters, its requirements and salient features. Explain in detail about how a Fricke dosimeter is used to measure absorbed dose.
   • A Fricke dosimeter was irradiated in Co-60 gamma chamber for 10 min. On spectroscopic measurement using 0.01m optical cell at 304 nm 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 (εG ($Fe^{+3}$) =352 x 10-6 $m^2J^{-1}$, ρ= 1024 $kgm^{-3}$, Irradiation temp = 27.8ºC, Measurement temperature = 26.1ºC (9+5)

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

3. Explain in detail about re-entrant type gamma ionization chamber
4. Define briefly Absorbed dose, Kerma and Exposure. Derive the relationship between them under charged particle equilibrium
5. Explain how a brachytherapy source is calibrated using well type ionization chamber
6. How is neutron flux measured by (n,γ) and (n, p) reactions

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

7. Primary and secondary standard dosimeters
8. Neutron Yield
9. Linear and mass attenuation coefficient
10. Reactor produced isotopes
11. Reference Air Kerma Rate
12. Ambient and directional dose equivalent
13. How is radio colloid of Gold prepared
14. Beta ray applicator
15. Charged particle equilibrium
16. Neutron survey meters

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