

**Post M.Sc Diploma in Radiological Physics Regular/Supplementary
Examinations October 2025
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*
- *Simple calculator shall only be permitted*

Essays**(2x14=28)**

1. a) Explain Burlin and Spencer- Attix cavity theory. Discuss its merits and demerits over Bragg- Gray cavity theory.
b) Alpha source of 200 Bq activity with 6MeV energy is kept inside a gas filled detector. If all the particles completely absorb their energy inside the detector calculate the average current. (Given $W/e = 33.3$ eV and $e = 1.6 \times 10^{-19}$ C).
(9+5)
2. a) Explain in detail how the output (Dw) of a telecobalt machine is measured using TRS 398 protocol.
b) Calculate the dose rate in Gy/min for an average electrometer reading of 28.2 nC for a set machine time of 3 minutes in a telecobalt machine. $T_1 = 22^\circ\text{C}$, $T_2 = 22.2^\circ\text{C}$, $P_1 = 1007$ mbar, $P_2 = 1010$ mbar, $\tau = 0.02$ min, $NDW = 4.83 \times 10^7$ Gy/C at 20°C and 1013.2 mbar.
(9+5)

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

3. Explain how brachytherapy source is calibrated using well type ionisation chamber.
4. Describe the standardisation of beta emitters with proportional, GM and scintillation counter.
5. Describe in detail about the classification of neutron sources and dosimetry procedures.
6. Describe FBX dosimeter and its application in radiotherapy.

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

7. Role of sodium chloride in Fricke dosimeter.
8. Air Kerma strength.
9. 4π counting.
10. Application of chemical dosimeters in radiotherapy.
11. Precision long counter.
12. Preparation of Ir-192 source.
13. Timer error in telecobalt machine.
14. Preparation of tracers and labelled compounds.
15. Relation between absorbed dose and Kerma.
16. Neutron survey meter.

CORRECTION/NO-CORRECTION FILE

QP CODE: 105391

Date: 08/10/2025

Question No. 2.(b)

‘NDW= 4.83x10⁷’ corrected as “ $N_{DW} = 4.83 \times 10^7$ ”

Corrections/Modifications/Replacement of Questions if any shall be made available to all students. Take the print out of the Correction File in such cases and distribute to all students.

(Sd/-)

Controller of Examinations