

QP Code: 106391

Reg. No.....

**Post M.Sc Diploma in Radiological Physics Regular/Supplementary
Examinations October 2025**

Radiation Detectors and Instrumentation

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*

Essay:

(2x14=28)

1. Describe the three different modes of radiation detector operation. What are the advantages and disadvantages of each mode.
A current of 10^{-8} A is to be integrated for 60 ms on a capacitor, $C = 0.01 \mu\text{F}$. Determine the output voltage. (9+5)
2. Explain the principle of luminescent dosimetry. Briefly explain the role of thermoluminescence and optically stimulated luminescence dosimeters in radiation dosimetry.
A pocket dosimeter having a capacitance of 10 pF and an air volume of 5 cm^3 at STP is charged to a voltage of 200V. What would be the value of x-ray exposure that will reduce the chamber voltage to 50 V. (9+5)

Short Essays

(4x8=32)

3. Working principle OP-AMP and its application in radiation dosimeters
4. Quenching mechanism of a GM counter
5. Working of isotope calibrator with a neat diagram
6. Principle of chemical dosimeters and their role in radiation dosimetry

Short Notes

(10x4=40)

7. DC-DC converter
8. Calorimeters
9. Gas multiplication
10. Dead time and recovery time
11. Teletector
12. Hand, foot and laundry monitors
13. Single channel and multi-channel analyzer
14. Radio chromic film
15. Radiation field analyzer
16. Photomultiplier tube
