

**QP Code: 106391**

**Reg. No.....**

**Post M.Sc Diploma in Radiological Physics Regular/Supplementary  
Examinations October 2019**

**Radiation Detectors and Instrumentation**

**Time: 3 hours**

**Max. Marks: 100**

- **Answer all questions**
- **Use of Calculators/physical and mathematical tables permitted.**

**Essay:**

**(2x14=28)**

1. Explain the phenomenon of luminescent dosimetry based on band gap theory. Discuss the similarities and dissimilarities of TLD and OSLD.  
A 30 min counting for an unknown radioactive sample led to the gross counts of 4,000 counts. The background counts for the same counting time were 3,600 counts. Compute the net count and its uncertainty. (9+5)
2. Explain the principle of gas filled detectors. Discuss the construction and working of thimble ionization chamber.  
A certain G.M. counter has a dead time of 150  $\mu$ s after each discharge, during which a further particle entering is not detected. If it's true counting rate is 32, 432 cpm, what is the expected observed counting rate. (9+5)

**Short Essays**

**(4x8=32)**

3. Principle of chemical dosimeters and their role in radiation dosimetry
4. Construction and working of condenser type chamber.
5. Working of isotope calibrator with a neat diagram.
6. Working of semiconductor diode and its application in radiotherapy

**Short Notes**

**(10x4=40)**

7. DC-DC converter
8. Radiographic film
9. Rem counter
10. Liquid scintillation counting system
11. Film densitometer
12. Contamination monitor
13. Film badge
14. Photomultiplier tube
15. Operational amplifier
16. Radiation field analyzer

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