

QP Code: 106391

Reg. No.....

Post M.Sc Diploma in Radiological Physics Examination July 2016

Radiation Detectors and Instrumentation

Time: 3 hours

Maximum Marks: 100

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

Essay

(2 x 14 = 28)

1. Explain the basic principles involved in liquid scintillation and plastic scintillation system. Mention its applications
A beta scintillation counter with a plastic scintillator of area 100 cm^2 has a counting efficiency of 25% for a given geometry. What is the measured count rate when it is used monitor a beta contamination of 100 Bq/cm^2
(9+5 = 14)
2. Describe the gas multiplication process in a GM counter including the requirement of quenching. Explain about resolving and dead times, how you would correct the observed counts to obtain the true counts.
A counting rate of 15100 counts/min is indicated by a GM tube having a dead time of $250 \mu\text{s}$. What would be counting rate if the dead time phenomenon were not present.
(9+5 = 14)

Short Essay

(4 x 8 = 32)

3. Stem effect and stem correction for condenser type ion chamber.
4. Characteristics of organic and inorganic scintillation counters.
5. Working principle of Rem counter
6. Working principle of MOSFET and its application in radiotherapy

Short Notes

(10 x 4 = 40)

7. Microprocessor
8. Types of electrometers
9. Organic quenching
10. Glow curve of TL dosimeter
11. Gamma zone monitor
12. Contamination monitor
13. RIA counter
14. Radiophoto luminescent dosimeter
15. Photomultiplier tube
16. Survey meter
