QP Code: 106391 **Reg. No.....**

Post M.Sc Diploma in Radiological Physics Examination
January 2018

Radiation Detectors and Instrumentation

Time: 3 hours **Maximum Marks: 100**

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

Essay **(2x14=28)**

1. Explain the principle and properties of a gas filled detector. Describe the characteristic curve of gas filled detector with a neat diagram.

   A 3 MeV alpha particle deposits all its energy in the counter and produce 10^5 electron- ion pairs. What is the expected current, if the charges created are collected in a time of 1μs. (9+5=14)

2. Describe the essential features of a proportional counter including the process of gas multiplication with the help of a block diagram.

   Calculate the minimum current that must be measured if a 1 liter ion chamber is to be used as a gamma survey meter down to dose rate of 0.5 mR/h. (9+5=14)

Short Essay **(4 x 8 = 32)**

3. Characteristics of a thimble ionization chamber
4. Liquid scintillation counting system
5. Well type ion chamber for brachytherapy source calibration
6. Working principle of semiconductor diode and its application in radiotherapy

Short Notes **(10 x 4 = 40)**

7. Decoders and Encoders
8. Townsend balance secondary standard dosimeter
9. Calibration of thermoluminescent dosimeter
10. Film badge
11. Scintillation monitor
12. Pocket dosimeter
13. Gamma ray spectroscopy
14. Radiographic film
15. Phantoms
16. Rem counter

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