

S. No. of Question Paper: 1516

Name of the Course: **B.Sc. Physical sciences, NEP, DSE**

Semester: **V**

Name of the paper: **Radiation and its applications**

Unique Paper Code: 2223510020

Duration: **2 Hours**

Maximum Marks: **60**

(Write your Roll. No. on the top immediately on receipt of this question paper.)

Attempt *Five* questions in all

Question No. **1** is compulsory

Use of non-programmable scientific calculator is allowed.

1. Attempt any *five* of the following questions:

- (i) What is an auger electron? How would you calculate its energy?
- (ii) What is the necessity of knowing linear and mass attenuation coefficients
- (iii) How do the heavy charged particles and the gamma rays interact with matter?
- (iv) What do you mean by KERMA and ALI.
- (v) What do you mean by Derived Air Concentration (DAC)?
- (vi) What is Accelerator driven sub-critical system (ADS) for waste management?
- (vii) Explain the principle and working of MRI? 6x2=12

2. (i) Compare and contrast the properties and interactions of alpha, beta, and gamma radiation. (6)

(ii) Explain the phenomena of Bremsstrahlung and its relevance in beta particle interactions. (6)

3. (i) Using Beth-Bloch Formula, describe the energy loss of heavy charged particles (such as alpha particles or accelerated ions) as they interact with matter? (6)

(ii) Discuss the operational limits and methods used to evaluate and control radiation hazards. (6)

4. (i) Explain Photoelectric effect, Compton scattering, and pair production as mechanisms of photon interaction with matter. (6)
- (ii) Define and differentiate between effective dose, absorbed dose, and equivalent dose. (6)
5. (i). What is the working principle of a gas detector? (6)
- (ii) How is a Geiger counter different from a simple proportional counter. (6)
6. Explain process of pulse formation in semiconductor detectors by giving a schematic diagram, its construction and its principle of working in detail. For which type of radiation and energy radiation can these detectors be used, give an approximate energy range.

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7. Mention any three applications of nuclear techniques for the field of medical science and give their schematic diagram, principle, working in detail.

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