NUCLEAR MEDICINE

PAPER – I

NUC.MED/APRIL/16/24/I

Time : 3 hours
Max. Marks : 100

Important instructions:

- *Attempt all questions in order.*
- *Each question carries 10 marks.*
- *Read the question carefully and answer to the point neatly and legibly.*
- *Do not leave any blank pages between two answers.*
- *Indicate the question number correctly for the answer in the margin space.*
- *Answer all the parts of a single question together.*
- *Start the answer to a question on a fresh page or leave adequate space between two answers.*
- *Draw table/diagrams/flowcharts wherever appropriate.*

Write short notes on:

1. Principles of gas filled detectors and its uses in a high volume Nuclear Medicine Department. 5+5

2. a) Thyroid intake probe. 5+5
   b) Gamma well counter.

3. a) Methods of production of radionuclides. 7+3
   b) Can cyclotron produced radionuclides replace other form of radionuclides?

4. Derive the radioactive decay equation. Prove that product of physical half life and decay constant is also constant. 5+5

5. a) Linear energy transfer. 5+5
   b) Bremsstrahlung radiation.

6. If 1mCi of a radionuclide is adequately shielded by 6 HVLs of lead, how many HVLs would be needed to have equal shielding for (a) 5 mCi & (b) 8 mCi of radionuclides 5+5

7. Photoelectric and Compton scattering processes. 5+5

8. a) Linear regression and least square fit. 5+5
   b) Types of crystals used in PET scanner.

9. Discuss Cell Survival Curves and its relation to linear quadratic (LQ) model and linear non-threshold (LNT) model. 5+2.5+2.5

10. Advantages of SPECT-CT hybrid imaging over SPECT imaging in diagnostic evaluation. 10

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