NUCLEAR MEDICINE

PAPER – I

NM/J/17/24/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. a) Absorbed dose, equivalent dose and effective dose. 5+5
   b) Derive radioactive decay equation.

2. a) Define various modes of radioactive decay. 5+5
   b) Decay chart of ^{124}I.

3. a) Effect of compartmental model in GFR estimation. 5+5
   b) National rules pertaining to transport of radioactive substances.

4. a) Define calibration factor of PET scanner. 2+2+6
   b) Branching fraction of radionuclides.
   c) A cylindrical uniform phantom had 40MBq of ^{68}Ge-^{68}Ga radioactivity. A PET scanner gives 4000 counts per second reading from the phantom. A patient was injected 10mCi of ^{18}F-FDG and after scanning an ROI of lesion gives 7000 counts per second. Calculate how much activity is present in the lesion.

5. a) Beam hardening effect. 2.5x4
   b) Truncation error.
   c) Scatters in PET imaging.
   d) Partial volume effect.

6. a) Sensitivity 2.5x4
   b) Specificity
   c) Positive predictive value
   d) Accuracy

7. a) Deterministic effect 5+5
   b) Cell-Survival Curves

P.T.O.

NUCLEAR MEDICINE

PAPER – I

8. a) Gamma Ray Spectrometry 5+5
   b) DICOM & PACS

9. a) Photomultiplier tube (PMT). 4+6
   b) Photodiodes and APDs.

10. a) Poisson's distribution 2.5x4
    b) Wipe test
    c) Chi-Square test
    d) Null hypothesis

****