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 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.

1. Describe in detail the anatomy of thyroid gland with illustrations. 10
2. a) Receiver operator curves (ROC) 5+5
   b) Gaussian and Poisson distribution
3. What is a scintillation detector? Enumerate characteristics of various scintillation detectors used in PET scanners with their merits and demerits. 2+8
4. Principle and applications of:
   a) PEM (Position Emission Mammography) 5+5
   b) CZT (Cadmium Zinc Tellurite)
5. QC procedures performed on SPECT camera in day to day practice and during periodic maintenance. 10
6. a) Describe various PET-MRI systems available with merits and demerits of each. 6+4
   b) Advantages and Limitations of PET-MRI in oncological practice.
7. a) Filtered Back Projection. 5+5
   b) Iterative Reconstruction Algorithms.
8. Enumerate various Radiation Monitoring devices. Describe the working principle, design and utility of TLD and Pocket dosimeter. 2+8
9. a) What is transport index? How are the different packages categorized based on this. 3+7
   b) Classify radio-active waste. Mention various methods of waste disposal with the acceptable limits.
10. a) Quenching in liquid scintillation counting. 5+5
    b) SPM and its applications in Nuclear Medicine.

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