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) Principles of Gas filled detectors.  
   b) Dose calibrator.  

2. Describe various radioactive decay modes and draw the decay chart of Lu-177.  

3. a) Collimators  
   b) Spectrometer  
   c) Line spread function  
   d) Flood Source  

4. a) PACS  
   b) PET Radionuclide Generators  

5. Enumerate various compartmental analysis models and describe in details a two-compartmental model system.  

6. Enumerate various mathematical filters and describe Butterworth filter and its applications in image processing.  

7. Discuss biological effects of low-level radiation. What is radiation hermesis?  

8. Compare and contrast the ICRP 1990 and ICRP 2006 recommendations.  

9. a) McNemmar Test  
   b) Compare and contrast Gaussian and Poisson's distribution systems.  

10. Compare and contrast PET/CT and PET/MR in oncological applications.  

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POSSESSION / USE OF CELL PHONES OR ANY SUCH ELECTRONIC GADGETS IS NOT PERMITTED INSIDE THE EXAMINATION HALL.