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**1104E142**

Candidate's Seat No : \_\_\_\_\_

**M.Sc. Sem.-4 Examination**

**507**

**Medical Physics**

**April-2025**

**[Max. Marks : 70**

**Time : 2-30 Hours]**

Q.1 Why commissioning measurements are important for patient treatments? Describe in detail various commissioning measurements for a photon beam. [14]

OR

Q.1 a) Describe major sub-systems of a telecobalt machine and define isocenter. [14]

b) Explain the effects of source size and source to diaphragm distance (SDD) on the geometric penumbra of a telecobalt beam. What will be the width of geometric penumbra at a depth of 10 cm from a telecobalt machine (NTD 80 cm and collimator to isocenter distance 35 cm) loaded with a source of size 2 cm?

Q.2 Define practical range ( $R_p$ ) and therapeutic range ( $R_t$ ) of a electron beam. Which type of tumours could best be treated with a electron beam and why? Can a electron beam be used without scattering foils? [14]

OR

Q.2 Explain in detail electron beam dosimetry. [14]

Q.3 Write a note on Quality Assurance for Brachytherapy Unit in detail. Also list down the IEC requirements for RAL Brachytherapy unit. [14]

OR

Q.3 Write a note on TG 43 formalism. [14]

Q.4 What is Intensity Modulated Radiotherapy and how does it differ from conventional radiotherapy? Discuss the importance of image guidance in IMRT. [14]

OR

(P.T.O)

- Q.4 Write a note on stereotactic radiosurgery. Explain about the various equipments available for the same. [14]
- Q.5 Attempt any seven out of twelve from the following (Each question is of two marks): [14]
- (i) Define scatter-air ratio?
  - (ii) Write short note on Radiation Therapy.
  - (iii) What is the basis of radiotherapy?
  - (iv) What is use of EPID?
  - (v) What is the necessity of in-vivo dosimetry?
  - (vi) Write any two QA tests for radiotherapy simulator.
  - (vii) What do we mean by ocular Brachytherapy?
  - (viii) Define ACTIVITY, APPARENT ACTIVITY and SPECIFIC ACTIVITY as used in radiation therapy. Provide the unit of measurement for each of these terms.
  - (ix) Give one clinical use for each of these radionuclides: Cesium-137, Strontium-90 and Iodine-125 and also identify the types of emission produced.
  - (x) List the benefits from the use of an electronic portal imaging device in treatment verification.
  - (xi) How many  $^{60}\text{Co}$  sources are used in Gamma Knife unit and what is the total activity of the  $^{60}\text{Co}$  sources?
  - (xii) What is patient specific Quality assurance of an IMRT treatment? Why this has to be performed for IMRT?