[LD 0212] **AUGUST 2013** **Sub.Code :1911**

B.Sc. RADIOTHERAPHY TECHNOLOGY

SECOND YEAR

PAPER I – PHYSICS OF RADIOTHERAPY & EQUIPMENTS

Q.P. Code: 801911

Time: Three hours **Maximum : 100 Marks**

Answer All questions

I. Elaborate on: **3 x 10 = 30**

1. Explain with a suitable diagram the working of VANDE GRAFF generator
2. How do we specify the Tumour dose and explain the different terminologies used in Tumour Dose Specification
3. What are the different dosimetry systems available in brachytherapy

II. Write notes on **8 x 5 = 40**

1. What is the principle of working of a BETATRON?
2. Explain the working of a Linear Accelerator
3. Derive an equation to establish the relation between TAR & Percentage Depth Dose
4. How do we correct contour irregularities?
5. Write a note on treatment Simulators
6. Explain the importance of Multi leaf collimators in radiotherapy
7. Write a brief note on HDR units
8. Determine the exposure rate in R/min from 5000 Ci source of Cobalt 60 at a distance of 80 cm

III. Short answers on **10 x 3 = 30**

1. Write a note on bolus materials
2. Define Tissue Air Ratio
3. What are Heavy particles? Mention few of them used in therapy
4. Define Penumbra in Cobalt 60 machines & how can it be corrected
5. What are beam-directing devices?
6. Distinguish between wedges and wedge filters
7. What are the corrections for tissue inhomogenities?
8. Describe IMRT concept
9. What is back scatter factor?
10. What is skin sparing effect?

****

[LF 0212] **AUGUST 2014** **Sub.Code :1911**

B.Sc. RADIOTHERAPHY TECHNOLOGY
SECOND YEAR
PAPER I – PHYSICS OF RADIOTHERAPY & EQUIPMENTS

Q.P. Code: 801911

Time: Three hours **Maximum : 100 Marks**

Answer All Questions

I. Elaborate on: **(3 x 10 = 30)**

1. The different methods used to correct the contour irregularities.
2. The relationship between percentage depth dose, tissue air ratio and back scatter factor.
3. Classification of kilovoltage units and their salient features.

II. Write notes on: **(8 x 5 = 40)**

1. The characteristics of a clinical electron beam
2. Different types of multileaf collimators and their uses
3. The properties of two sources used in high dose rate remote after loading system and its advantages and disadvantages
4. Tissue compensators
5. The features of superficial therapy and ortho voltage x-ray production
6. Treatment planning system for external beam therapy
7. The various factors influencing percentage depth dose
8. Front and back pointer

III. Short answers on: **(10 x 3 = 30)**

1. Disadvantages of kilovoltage units
2. List the different types of wedges
3. Calculate the equivalent square field of 8x 12 cm^2
4. Distinguish between klystron and magnetron
5. Concept of irregular field
6. Orthogonal verification of intracavitory application
7. Heavy particle beams
8. Betatron and microtron
9. Penumbra trimmers
10. Surface mould Brachytherapy treatment

****

[LG 0215] **FEBRUARY 2015** **Sub.Code :1911**

B.Sc. RADIOTHERAPHY TECHNOLOGY

SECOND YEAR

PAPER I – PHYSICS OF RADIOTHERAPY AND EQUIPMENTS

Q.P. Code: 801911

Time: Three Hours **Maximum : 100 Marks**

Answer All Questions

I. Elaborate on: **(3 x 10 = 30)**

1. The source housing and ON – OFF mechanisms of telecobalt units with a neat diagram.
2. The methods used for obtaining broad electron beam and the electron beam collimation system of a Linear Accelerator.
3. The advantages of remote after loading systems in brachytherapy.

II. Write Notes on: **(8 x 5 = 40)**

1. Deep x-ray therapy and its applications
2. What are penumbra trimmers? Write the advantages and disadvantages of the same.
3. What is depth of dose maximum? Describe the methods to increase the surface dose.
4. Isocentric technique and its advantages.
5. Advantages of electron beams and the therapeutic range.
6. Wedges and types of wedges used in linear accelerators.
7. Methods used for applying tissue heterogeneity correction.
8. Intracavitary Brachytherapy, the sources and the techniques used for various sites.

III. Short Answers on: **(10 x 3 = 30)**

1. Superficial x-ray therapy.
2. What is a magnetron and where is it used?
3. Define percentage depth dose.
4. Define scatter-to- air ratio.
5. The factors used for treatment time calculation in SAD technique.
6. What are isodose charts and their uses?
7. The method for reducing the hot spot and over lapping of beams for two adjacent photon fields.
8. Write the differences between LDR, MDR and HDR brachytherapy treatments.
9. Permanent implant.
10. Calibration of Brachytherapy sources.

****

[LH 0815] **AUGUST 2015** **Sub.Code :1911**

B.Sc. RADIOTHERAPY TECHNOLOGY

SECOND YEAR

PAPER I – PHYSICS OF RADIOTHERAPY AND EQUIPMENTS

Q.P. Code: 801911

Time: Three Hours **Maximum : 100 Marks**

Answer All Questions

I. Elaborate on: **(3 x 10 = 30)**

1. Explain the various corrections for Tissue Inhomogeneities.
2. Explain in detail about the principle and working of a Medical Linear Accelerator with suitable diagram.
3. Beam directing devices a) Penumbra trimmers b) Front and Back pointer. c) Pin and Arc.

II. Write Notes on: **(8 x 5 = 40)**

1. Kilovoltage therapy and its applications.
2. Write about the different source movement mechanisms in Telecobalt machines.
3. a) Equivalent square field concept and its clinical significance,
   b) Calculate equivalent square field for 6 x 8 cm^2.
4. Calculate the Monitor Units (MU) required to deliver 200 cGy of dose to the tumor located at the depth of 15 cm (PDD = 63.6%, TPR = 78.6%) in SSD technique for the field size of 15 x 15 cm^2 (Output = 100 cGy / 100 MU for 10 x 10 cm^2 , Output factor for 15 x 15 cm^2 = 1.034 cGy/MU) using Anterior to Posterior (AP) and Posterior to Anterior (PA) fields in 15 MV photon beam.
5. Explain the various tumor volumes with neat diagram.
6. Preparation of Customized Blocks.
7. Physical characteristics of five radionuclides used in Brachytherapy.
8. Explain the Intracavitory brachytherapy application simulation procedure.

III. Short Answers on: **(10 x 3 = 30)**

1. Contact therapy.
2. Draw the decay scheme of Cobalt-60 radionuclide.
3. Define Tissue Maximum Ratio.
4. Draw the diagram of a linear accelerator head for photon mode.
5. Define Isocentre.
6. Define Wedge angle and write the relationship between wedge angle and hinge angle.
7. Define stopping power.
8. What is meant by exposure rate constant?
9. Why Radium is not used in brachytherapy now a days?
10. Name few brachytherapy dosimetry system.

****

[LI 0216] FEBRUARY 2016 **Sub.Code :1911**

B.Sc. RADIOTHERAPY TECHNOLOGY

SECOND YEAR

PAPER I – PHYSICS OF RADIOTHERAPY AND EQUIPMENTS

Q.P. Code: 801911

Time: Three Hours **Maximum : 100 Marks**

Answer All Questions

I. Elaborate on: **(3 x 10 = 30)**

1. a) Describe in details about Telecobalt units and its different source movement mechanisms. b) Draw decay scheme of cobalt-60 radioisotopes.
2. Explain the parameters which affect the central axis depth dose distribution.
3. Explain the various brachytherapy applications in details.

II. Write Notes on: **(8 x 5 = 40)**

1. Write about the working of microtron.
2. Explain the construction and working of Klystron with suitable diagram. Write the limitation of Magnetron.
3. Write about the Isodose shift method for the correction contour irregularities.
4. Write about the methods used to calculate the separation of adjacent fields.
5. Calculate the Monitor Units (MU) required to deliver 300 cGy of dose to the tumor located at the depth of 8 cm (PDD = 75.8%, TPR = 86.3%) in SAD technique for the field size of 12 x 12 cm^2 (Output = 100 cGy / 100 MU for 10 x 10 cm^2 , Output factor for 12 x 12 cm^2 = 1.0143 cGy/MU) using Right lateral field and Left lateral field in 6 MV photon beam.
6. Write the electron interaction with matter and electron beam characteristics.
7. Write about the commercial available multileaf collimator.
8. Describe the Low Dose Rate (LDR) Bhabha Atomic Research Centre (BARC) Cesium – 137 Kit. Draw the decay scheme of Cesium 137.

III. Short Answers on: **(10 x 3 = 30)**

1. Orthovoltage therapy and its application.
2. Define Physical Penumbra.
3. What is meant by Isodose chart?
4. Define wedge filter.
5. What is meant by enhanced dynamic wedge?
6. Define off-axis ratio.
7. Write the composition of cerrobend and its advantage.
8. What is collimator scatter factor?
9. Define Air kerma strength.
10. What is meant by apparent activity?

****

[LJ 0816] AUGUST 2016 **Sub.Code :1911**

B.Sc. RADIOTHERAPY TECHNOLOGY

SECOND YEAR

PAPER I – PHYSICS OF RADIOTHERAPY AND EQUIPMENTS

Q.P. Code: 801911

Time: Three Hours **Maximum : 100 Marks**

Answer All Questions

I. Elaborate on: **(3 x 10 = 30)**

1. Explain in detail about the Co-60 radio isotope teletherapy machine and its different source movement mechanisms.
2. Describe the various type of brachytherapy applications in detail.
3. Explain the radiotherapy treatment delivery techniques (a) Source to Surface Distance (SSD), (b) Source to Axis Distance (SAD) and (c) Rotational techniques with suitable clinical example.

II. Write Notes on: **(8 x 5 = 40)**

1. Write note on Magnetron.
2. What is penumbra? How to find the penumbral width?
3. Short note on characteristics of electron beams.
4. Draw diagram of a linear accelerator head for photon mode and explain the function of each parts.
5. Calculate the Time (min) required to deliver 200 cGy of dose to the tumor located at the depth of 5 cm (PDD = 76.7%, TMR = 85.1%) in SSD technique for the field size of 12 x 8 cm^2 (Output = 120 cGy/min) using single posterior (PA) field in Co-60 machine with 80 cm SSD.
6. Short note on HDR brachytherapy system with its advantages.
7. Write a note on isodose curves and its method of measurement.
8. Explain the concept of IMRT.

III. Short Answers on: **(10 x 3 = 30)**

1. Superficial therapy.
2. Write two brachytherapy radionuclides and their physical characteristics.
3. Tissue Maximum ratio.
4. Practical range (Rp) of an electron beam.
5. Planning Target Volume (PTV).
6. Wedge filters.
7. Write classification of brachytherapy based on dose rate.
8. Isodose Chart.
9. Define Air kerma strength.
10. Advantages of Heavy particle beam.

****