

[LH 0815]

AUGUST 2015

Sub. Code: 1908

B.Sc. RADIOTHERAPY TECHNOLOGY
(New Syllabus 2014-2015)

FIRST YEAR

PAPER III – RADIOTHERAPY PHYSICS AND PRINCIPLES OF
RADIOTHERAPY

Q.P. Code: 801908

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

I. Elaborate on:

(3 x 10 = 30)

1. Explain the interaction of electron with matter.
2. With the help of neat sketch explain the construction and working of Co-60 tele therapy unit.
3. Give a detailed account of wedges used in radiotherapy.

II. Write notes on:

(10 x 5 = 50)

1. Compton effect.
2. Iso dose curves.
3. Linear accelerator.
4. Simulators used in radiotherapy planning.
5. Factors that depends of percentage depth dose.
6. Immobilization devises in radiotherapy.
7. SRT and SRS.
8. Bolus and phantom materials.

III. Short Answers on:

(10 x 2 = 20)

1. Physical and biological half life.
2. LET.
3. Tissue compensators.
4. Bragg curve.
5. Particle range.
6. Tissue maximum dose.
7. Tissue Air Ratio.
8. Port film.
9. Physical characteristics of Co-60 radioactive isotope.
10. SSD and SAD techniques.

[LI 0216]

FEBRUARY 2016

Sub. Code: 1908

B.Sc. RADIOTHERAPY TECHNOLOGY

(New Syllabus 2014-2015)

FIRST YEAR

**PAPER III – RADIOTHERAPY PHYSICS AND PRINCIPLES OF
RADIOTHERAPY**

Q.P. Code: 801908

Time : Three Hours

Maximum : 100 Marks

Answer ALL questions.

I. Elaborate on:

(3 x 10 = 30)

1. Artificial Radioactivity? List out the various types of sources used in radiotherapy and their properties.
2. Explain the Interaction of charged particle with matter.
3. Describe elaborately the Intensity Modulated Radiotherapy.

II. Write notes on:

(8 x 5 = 40)

1. Define half-life of a radioactive substance. Derive the relationship between half-life and linear attenuation coefficient.
2. What is Radioactive series and Radioactive equilibrium?
3. Compare the SSD technique with SAD technique.
4. Various patient immobilization devices used in radiotherapy.
5. What is PDD? How to convert PDD from one SSD to another?
6. Explain the mode of photon interaction which is useful for imaging.
7. Port film.
8. Factors affecting percentage depth dose.

III. Short Answers on:

(10 x 3 = 30)

1. Decay process series of Co-60 source.
2. What is Linear Energy Transfer?
3. Bragg curve.
4. Tissue maximum Ratio.
5. Usage of compensators.
6. 1 Gy.
7. Particle range.
8. Stopping power ratio.
9. Advantages of rotational technique.
10. What is the difference between SRS and SRT?

**B.Sc. RADIOTHERAPY TECHNOLOGY
FIRST YEAR
PAPER III – RADIOTHERAPY PHYSICS AND PRINCIPLES OF
RADIOTHERAPY**

Q.P. Code: 801908

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

Answer all questions

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

1. Describe in detail the construction and working of a remote after loading brachytherapy unit. What are its merits over the manual brachytherapy unit?
2. What is the purpose of simulation? Explain the working of a conventional radiotherapy simulator with a neat diagram.
3. Elaborate on stereotactic radiotherapy and stereotactic radiosurgery and their advantages over other radiotherapy techniques. List the diseases that can be treated using these techniques.

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

1. List the properties of any four radioactive sources used in radiotherapy and its applications.
2. Patient immobilization devices.
3. Total attenuation co-efficient.
4. Intensity modulated radiotherapy.
5. Image Guided Radio Therapy (IGRT).
6. Factors affecting Tissue Air Ratio (TAR), Back Scatter Factor (BSF) and Tissue Maximum Ratio (TMR).
7. Discuss briefly the interaction of charged particles.
8. Explain tissue compensator with suitable examples.

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

1. What is block cutting device?
2. What is Bragg peak?
3. What is a beam directional device? Give an example.
4. List the different types of shutter systems used in telecobalt machines
5. What is the role of a phantom in dosimetry?
6. What is port film? State its use.
7. What is radioactive equilibrium?
8. What is natural and artificial radioactivity?
9. Define linear energy transfer and state its unit.
10. List three advantages of linear accelerator over telecobalt treatment unit.

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FIRST YEAR
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RADIOTHERAPY

Q.P. Code: 801908

Time: Three Hours

Maximum: 100 Marks

Answer all questions

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

1. Mention the types of interaction of radiation with matter and describe any two major interactions in detail.
2. What are the disadvantages of conventional radiotherapy? Describe briefly the some of the modern techniques and their advantages.
3. List the different types of telecobalt shutter systems. Write a detailed note about the working of a telecobalt unit with a neat diagram.

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

1. Styrofoam cutter and its applications.
2. List any three radioactive sources used in radiotherapy and mention their properties and applications.
3. Patient immobilization devices.
4. Stereotactic radiosurgery and stereotactic radiotherapy? List the differences between them.
5. What is wedge filter? Explain the types of wedge filters in radiotherapy.
6. Explain SSD and SAD techniques and list their merits and demerits.
7. Intensity modulated radiotherapy.
8. Metabolism and the excretion of the drugs used in the management of cancer.

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

1. What are shielding blocks used for? Give one disadvantage.
2. What is the role of bolus in radiotherapy?
3. List the different types of patient immobilization devices.
4. What are Isodose curves?
5. What is the major advantage of proton therapy over photon-based radiotherapy?
6. Define half-value layer.
7. What is the advantage of Tomotherapy over conventional radiotherapy?
8. What is skin sparing effect?
9. What is the type of target used in a linear accelerator?
10. What is the purpose of cytotoxic drugs?

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FIRST YEAR
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RADIOTHERAPY**

Q.P. Code: 801908

Time: Three Hours

Maximum: 100 Marks

Answer all questions

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

1. Physical, Biological and Effective half-lives.
2. Physical components of a linear accelerator.
3. SSD, SAD and Rotation techniques.

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

1. Radioactive equilibrium.
2. Attenuation, scattering, absorption.
3. Bolus.
4. Compensators.
5. PDD, TAR and TMR.
6. Remote afterloading brachytherapy units.
7. Simulator.
8. Shielding blocks.

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

1. Delta rays.
2. Bragg curve.
3. Secondary electrons.
4. Wedges.
5. Port film.
6. Phantom material.
7. SRS.
8. IMRT.
9. IGRT.
10. Tomotherapy.

B.Sc. RADIOTHERAPY TECHNOLOGY

FIRST YEAR

**PAPER III – RADIOTHERAPY PHYSICS AND PRINCIPLES OF
RADIOTHERAPY**

Q.P. Code: 801908

Time: Three Hours

Maximum: 100 Marks

Answer all questions

I. Elaborate on:

(3 x 10 = 30)

1. Patient immobilization devices.
2. Physical components of a remote afterloading brachytherapy unit.
3. A detailed account of wedges used in radiotherapy.

II. Write notes on:

(8 x 5 = 40)

1. Linear accelerator.
2. Physical and biological half-life.
3. Simulator.
4. Compensators.
5. Compare the SSD technique with SAD technique.
6. Intensity Modulated Radiotherapy.
7. List the different types of shutter systems used in telecobalt machines.
8. Tomotherapy.

III. Short answers on:

(10 x 3 = 30)

1. Role of a phantom in dosimetry.
2. Shielding blocks.
3. Secondary electrons.
4. IGRT.
5. What is the difference between SRS and SRT?
6. What is a beam directional device? Give an example.
7. Bragg curve.
8. Three advantages of linear accelerator over telecobalt treatment unit.
9. Gamma knife.
10. Port film.

B.Sc. RADIOTHERAPY TECHNOLOGY

FIRST YEAR

**PAPER III – RADIOTHERAPY PHYSICS AND PRINCIPLES OF
RADIOTHERAPY**

Q.P. Code: 801908

Time: Three Hours

Maximum: 100 Marks

Answer all questions

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

1. State the laws of radioactive decay. Derive the relationship between half-life and decay constant of radioisotope.
2. Explain in detail the process of Interaction of electron with matter.
3. Describe elaborately the technique of Stereotactic radiosurgery.

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

1. Define half-life of a radioactive substance. Derive the relationship between half-life and linear attenuation coefficient.
2. Gamma knife Unit
3. Various patient immobilization devices used in radiotherapy.
4. The factors which influence the Tissue Air Ratio?
5. Pair production.
6. Isodose curve.
7. Radioisotopes used in Medicine.
8. Compare the SSD technique with SAD technique.

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

1. Delta rays.
2. Stopping power ratio.
3. Bragg curve.
4. Scatter Air Ratio.
5. Tissue Compensator.
6. Ionization.
7. Particle range.
8. Linear Energy Transfer.
9. Advantages of rotational technique.
10. Wedges.

B.Sc. RADIOTHERAPY TECHNOLOGY

FIRST YEAR

**PAPER III – RADIOTHERAPY PHYSICS AND PRINCIPLES OF
RADIOTHERAPY**

Q.P. Code: 801908

Time: Three Hours

Maximum: 100 Marks

Answer all questions

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

1. Explain the main modes of interaction of photon with matter.
2. Explain the construction and working principle of Linear Accelerator.
3. Give a detailed discussion on Intensity Modulated Radiotherapy.

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

1. Tissue Equivalent Materials.
2. Isodose curves.
3. Energy transfer and Energy Absorption Coefficients.
4. Radiotherapy simulator.
5. Factors that influence percentage depth dose.
6. Immobilization devices in radiotherapy.
7. Stereotactic Radiotherapy.
8. Tissue Sparing Effect.

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

1. Physical and biological half life.
2. LET.
3. Tissue compensators.
4. Bragg curve.
5. Particle range.
6. Tissue maximum dose.
7. Tissue Air Ratio.
8. Port film.
9. Physical characteristics of Co-60 radioactive isotope.
10. SSD and SAD technique.

B.Sc. RADIOTHERAPY TECHNOLOGY

FIRST YEAR

**PAPER III – RADIOTHERAPY PHYSICS AND PRINCIPLES OF
RADIOTHERAPY**

Q.P. Code: 801908

Time: Three Hours

Maximum: 100 Marks

Answer all questions

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

1. Explain the construction and working principle of telecobalt machine.
2. Explain the mode of interaction of particle radiation.
3. Give a detailed discussion on IGRT.

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

1. Radioactive equilibrium.
2. Artificially Produced Radioisotopes.
3. Laws of Radioactivity.
4. Radiotherapy simulator.
5. Factors that influence Tissue Maximum Ratio.
6. Microwave generators used Linear Accelerator.
7. Conformal Radiotherapy.
8. Electronic Equilibrium.

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

1. Secondary electrons.
2. Relative Biological Effectiveness.
3. Tissue compensators.
4. What is a beam directional device? Give an example.
5. Radioisotopes.
6. Back Scatter Factor.
7. Percentage Depth Dose.
8. Gamma Knife.
9. Physical characteristics of electron beam.
10. Stopping Power Ratio.

B.Sc. RADIOTHERAPY TECHNOLOGY

FIRST YEAR

**PAPER III – RADIOTHERAPY PHYSICS AND PRINCIPLES OF
RADIOTHERAPY**

Q.P. Code: 801908

Time: Three Hours

Maximum: 100 Marks

Answer all questions

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

1. Explain in detail the process of interaction of electron with matter.
2. List the different types of telecobalt shutter systems. Write a detailed note about the working of a telecobalt unit with a neat diagram.
3. Physical components of a linear accelerator.

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

1. Energy transfer and energy absorption coefficients.
2. Immobilization devices in radiotherapy.
3. Define half – life of a radioactive substance. Derive the relationship between half-life and linear attenuation coefficient.
4. Isodose curve.
5. Compensators.
6. Compare the SSD technique with SAD technique.
7. Attenuation, scattering, absorption.
8. Bolus.

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

1. Particle range.
2. Advantages of rotational technique.
3. IGRT.
4. What is the difference between SRS and SRT?
5. Wedges.
6. What are shielding blocks used for? Give one disadvantage.
7. What is skin sparing effect?
8. What is bragg peak?
9. What is natural and artificial radioactivity?
10. Decay process series of Co-60 source.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 0321]

MARCH 2021

Sub. Code: 1908

(AUGUST 2020 EXAM SESSION)

B.Sc. RADIOTHERAPY TECHNOLOGY

FIRST YEAR (Regulations 2014-2015)

**PAPER III – RADIOTHERAPY PHYSICS AND PRINCIPLES OF
RADIOTHERAPY**

Q.P. Code : 801908

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on:

(3 x 10 = 30)

1. Explain the working of linear accelerator with suitable diagram.
2. Explain about remote afterloading Brachytherapy system and its advantages.
3. Explain in detail the interaction of Photon with matter.

II. Write notes on:

(8 x 5 = 40)

1. Wedge filters and its application in radiotherapy
2. Intensity Modulated radiotherapy
3. Patient immobilization devices
4. SSD and SAD technique
5. Radioisotopes used in Medicine
6. Isodose curves
7. Radioactive equilibrium
8. Factors used for SSD and SAD treatment time calculation.

III. Short answers on:

(10 x 3 = 30)

1. What is Bolus in RT?
2. Define BSF.
3. Define TAR.
4. Biological half life
5. What is LET?
6. Define HVL.
7. Define Wedge Angle.
8. Port Film
9. List the different types of shutter system used in telecobalt unit.
10. What is the purpose of cytotoxic drugs?

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 0422]

APRIL 2022

Sub. Code: 1908

(FEBRUARY 2021 & AUGUST 2021 EXAM SESSION)

B.Sc. RADIOTHERAPY TECHNOLOGY

FIRST YEAR (Regulations 2014-2015)

**PAPER III – RADIOTHERAPY PHYSICS & PRINCIPLES OF
RADIOTHERAPY**

Q.P NO. 801908

Time: Three Hours

Answer All questions

Maximum: 100 Marks

I. Elaborate on:

(3 x 10 = 30)

1. Write about Pair Production & Photon Disintegration.
2. What are the Disadvantages of Conventional Radiotherapy? Describe briefly of Modern Therapy Techniques & its Advantages.
3. Discuss about the Construction & Working of Gamma Knife Unit. Write down its Merits & Demerits.

II. Write notes on:

(8 x 5 = 40)

1. Various Types of Sources used in Radiotherapy and their Properties.
2. What is Radioactive Series and Radioactive Equilibrium?
3. What is IGRT? Explain about it.
4. What is Styrofoam Cutter? Write down its Application.
5. Physics of Bolus & Phantom material used in Radiotherapy.
6. Isodose Curve.
7. Factors affecting Percentage Depth Dose.
8. Uses of Stimulator for Treatment verification.

III. Short answers on:

(10 x 3 = 30)

1. Mean Life.
2. Ionization & Excitation.
3. LET.
4. Define Tissue Maximum Ratio.
5. Total Attenuation Coefficient.
6. What is the purpose of Cytotoxic Drugs?
7. IMRT.
8. Secondary Electron.
9. Delta Ray.
10. Isotopes & Isotones.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 1122]

NOVEMBER 2022

Sub. Code: 1908

**B.Sc. RADIOTHERAPY TECHNOLOGY
FIRST YEAR (Regulation 2014-2015)
PAPER III – RADIOTHERAPY PHYSICS & PRINCIPLES OF RADIOTHERAPY
Q.P NO. 801908**

Time: Three Hours

Answer All questions

Maximum: 100 Marks

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

1. Describe in detail about the construction and working of Co-60 teletherapy unit.
2. Describe the Intensity Modulated Radiotherapy.
3. What are the disadvantages of conventional radiotherapy? Describe briefly the three dimensional techniques and their advantages.

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

1. Factors that influence percentage depth dose.
2. Tissue Equivalent Materials.
3. Various patient immobilization devices used in radiotherapy.
4. Physical, biological half-life and their relationship.
5. Simulator.
6. Shielding blocks.
7. Explain SSD and SAD techniques and list their merits and demerits.
8. What is Radioactive series and radioactive equilibrium?

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

1. Ionization.
2. Wedges.
3. Secondary electrons.
4. Port film.
5. SRS.
6. What is the role of bolus in radiotherapy?
7. Define linear energy transfer and state its unit.
8. Usage of compensators.
9. Particle range.
10. Bragg curve.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 0423]

APRIL 2023

Sub. Code: 1908

B.Sc. RADIOTHERAPY TECHNOLOGY

FIRST YEAR (Regulation 2014-2015 onwards)

PAPER III – RADIOTHERAPY PHYSICS & PRINCIPLES OF RADIOTHERAPY

Q.P. Code: 801908

Time: Three Hours

Answer All questions

Maximum: 100 Marks

I. Elaborate on:

(3 x 10 = 30)

1. Artificial Radioactivity. List out the various types of sources used in RT and their properties.
2. Describe in detail the construction and working of a remote after loading Brachytherapy unit.
3. Elaborate on Stereotactic Radiotherapy and Radio surgery and their advantages over other Radiotherapy techniques.

II. Write notes on:

(8 x 5 = 40)

1. Total attenuation co-efficient.
2. Image Guided Radiotherapy.
3. Factors affecting Tissue Air Ratio, Back Scatter factor and Tissue Maximum Ratio.
4. Radio isotopes used in Medicine.
5. SRT and SRS.
6. Immobilization devices in Radiotherapy.
7. Relationship between half life and decay constant.
8. Tissue Equivalent Materials.

III. Short answers on:

(10 x 3 = 30)

1. Decay Process of Co-60 Source.
2. Wedge filter
3. Tissue Maximum dose.
4. Port film.
5. Particle range.
6. What is the role of a phantom in dosimetry?
7. Define Linear Energy Transfer and state its unit?
8. What is the advantage of Tomotherapy over conventional RT?
9. Explain Binding Energy.
10. Absorbed dose.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[AHS 1123]

NOVEMBER 2023

Sub. Code: 1908

B.Sc. RADIOTHERAPY TECHNOLOGY
FIRST YEAR (Regulation 2014-2015 onwards)
PAPER III – RADIOTHERAPY PHYSICS & PRINCIPLES OF RADIOTHERAPY
Q.P. Code: 801908

Time: Three Hours

Answer All questions

Maximum: 100 Marks

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

1. Explain about the construction and working of a Remote afterloading Brachytherapy Unit.
2. Write about SSD, SAD and Rotational techniques. Write down the procedure to convert PDD at a particular SSD to PDD of another SSD.
3. Write in detail about the various modes of Interaction of Photons with matter.

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

1. Tissue Air Ratio.
2. Role of Immobilisation in Radiotherapy.
3. Styrofoam cutter.
4. Relationship between Linear attenuation coefficient and HVL.
5. Wave guide.
6. Phantom and its types.
7. Tissue compensators.
8. Procedure for Acquiring port films.

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

1. Attenuation.
2. Stopping power ratio.
3. Ionisation and excitation.
4. Energy absorption coefficient.
5. Wedges.
6. Physical characteristics of Electron beam.
7. Write any two Cytotoxic drugs.
8. Define Gray.
9. MLC.
10. Isodose curves.
