

[LH 0815]

AUGUST 2015

Sub.Code :1907

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

FIRST YEAR

**PAPER II – BASIC PHYSICS, RADIATION PHYSICS AND BASIC OF
CLINICAL RADIOGRAPHY/IMAGING**

Q.P. Code: 801907

Time: Three Hours

Maximum : 100 Marks

Answer All Questions

I. Elaborate on:

(3 x 10 = 30)

1. Describe the construction and working of a Modern X ray tube.
2. With the help of neat sketch describe the working principles of Image intensifier tube used in fluoroscopic imaging.
3. Explain in detail about the different type of interaction of X and Gamma radiation with matter.

II. Write Notes on:

(8 x 5 = 40)

1. Ionization and Excitation.
2. Bremsstrahlung X ray spectrum.
3. Quality and intensity of X rays.
4. Exponential Decay of radioactivity.
5. X ray film construction.
6. Alpha and Beta decay with examples.
7. Basic theory of Tomography.
8. Advantages and disadvantages of MRI.

III. Short Answers on:

(10 x 3 = 30)

1. Define one Joule.
2. Define atomic number and mass number.
3. State coulomb's and Ohm's laws of Electricity.
4. Natural and artificial radioactivity.
5. Define Half life of radioactivity materials.
6. Define Specific activity in radioactive materials
7. Define Linear and mass attenuation coefficient.
8. Half value and Tenth value layer.
9. Bio effects of MRI.
10. What is SPECT?

[LI 0216]

FEBRUARY 2016

Sub.Code :1907

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

FIRST YEAR

**PAPER II – BASIC PHYSICS, RADIATION PHYSICS AND BASIC OF
CLINICAL RADIOGRAPHY/IMAGING**

Q.P. Code: 801907

Time: Three Hours

Maximum : 100 Marks

Answer All Questions

I. Elaborate on:

(3 x 10 = 30)

1. Discuss in detail the function of SPECT.
2. Describe the constituents of fixer and developer. Explain the automatic film processing.
3. Explain in detail how an image is formed in MRI?

II. Write Notes on:

(8 x 5 = 40)

1. Explain about the measurement of beam quality.
2. Radiographic film.
3. Interaction of gamma rays with matter.
4. Explain the principle of fluoroscopy. Explain the construction of the image intensifier.
5. Explain the working of Computed tomography.
6. Dark room.
7. Nuclear Fusion.
8. Difference between CT and MR images.

III. Short Answers on:

(10 x 3 = 30)

1. Radioisotope.
2. Electromagnetic spectrum.
3. Galvanometer.
4. Safe light.
5. HVL.
6. Ohms law.
7. Joules law.
8. Transformer.
9. Capacitor.
10. Hysteresis loss.

B.Sc. RADIOTHERAPY TECHNOLOGY

FIRST YEAR

**PAPER II – BASIC PHYSICS, RADIATION PHYSICS AND BASIC OF
CLINICAL RADIOGRAPHY/IMAGING**

Q.P. Code: 801907

Time: Three Hours

Maximum: 100 Marks

Answer all questions

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

1. Describe in detail Galvanometer, voltmeter, ammeter and multimeter.
2. Explain production of X-rays, Continuous spectrum and characteristic X-rays.
3. Explain in detail film processing methods. Explain the effects of temperature and development time in film processing.

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

1. Explain nuclear forces and Nuclear Energy levels.
2. What is isotope, isomer, isotone and isobar? Give example.
3. Explain CCD and CRT monitors.
4. Quantum theory of radiation.
5. Electron capture and internal conversion.
6. Explain in details about Contrast, Film speed and Latitude.
7. Factors affecting the fluoroscopic image.
8. Basic Principles of MRI and imaging methods.

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

1. Constituents of atom.
2. SI units of work, force, power and energy.
3. Nuclear fission.
4. Explain Coulomb's law.
5. Half value layer.
6. Pair production.
7. Fog and noise.
8. Fluorescent screen.
9. Linear attenuation coefficient.
10. PET CT.

B.Sc. RADIOTHERAPY TECHNOLOGY

FIRST YEAR

**PAPER II – BASIC PHYSICS, RADIATION PHYSICS AND BASIC OF
CLINICAL RADIOGRAPHY/IMAGING**

Q.P. Code: 801907

Time: Three Hours

Maximum: 100 Marks

Answer all questions

I. Elaborate on:

(3 x 10 = 30)

1. Discuss Photo-electric absorption, Compton scattering and pair production process.
2. Write an essay on film processing methods. Add a note on the effects of temperature in film processing.
3. Explain computed tomography with suitable diagram.

II. Write notes on:

(8 x 5 = 40)

1. Write notes on Periodic table.
2. Explain ohms law, coulomb's law and joule's law.
3. Explain in details about Contrast, Film speed and Latitude.
4. Step up and step down transformer.
5. Types of radioactive decay with examples.
6. Photoelectric effect and Compton effect.
7. Factors affecting the fluoroscopic image.
8. Basic Principles of MRI and imaging methods.

III. Short answers on:

(10 x 3 = 30)

1. SI unit of Temperature.
2. Define Isotope and Isobar.
3. Heel effect.
4. Linear attenuation coefficient.
5. Fog and noise.
6. Difference between CT and MRI.
7. Fluoroscopy.
8. Characteristic X-ray.
9. Half value layer.
10. Optical density.

B.Sc. RADIOTHERAPY TECHNOLOGY
FIRST YEAR

**PAPER II – BASIC PHYSICS, RADIATION PHYSICS AND BASIC OF
CLINICAL RADIOGRAPHY/IMAGING**

Q.P. Code: 801907

Time: Three Hours

Maximum: 100 Marks

Answer all questions

I. Elaborate on:

(3 x 10 = 30)

1. How are x-rays produced? Explain the working of a stationary anode x-ray tube and mention its applications and demerits.
2. Explain the process of alpha decay, beta decay and gamma decay with suitable examples.
3. Elucidate in detail the principle and working of an ammeter, galvanometer and voltmeter. Mention their applications and uses.

II. Write notes on:

(8 x 5 = 40)

1. Quantum theory of radiation.
2. Factors affecting quality of x-rays.
3. Compton scattering.
4. Principles of Magnetic Resonance Image formation.
5. Characteristic X-ray spectrum.
6. Multimeter and its uses.
7. Constituents of an atom.
8. Factors affecting the fluoroscopic image.

III. Short answers on:

(10 x 3 = 30)

1. Define Linear attenuation coefficient.
2. Give the principle of tomography.
3. What is Thermionic emission?
4. Define Half life and give two examples.
5. What is Image quality?
6. What are the constituents of film developer?
7. Hysteresis loss.
8. Role of dark room.
9. Difference between fog and noise.
10. State Ohms law with an example.

B.Sc. RADIOTHERAPY TECHNOLOGY**FIRST YEAR****PAPER II – BASIC PHYSICS, RADIATION PHYSICS AND BASIC OF
CLINICAL RADIOGRAPHY/IMAGING****Q.P. Code: 801907****Time: Three Hours****Maximum: 100 Marks****Answer all questions****I. Elaborate on:****(3 x 10 = 30)**

1. With a neat diagram, describe in detail the principle, construction and working of a rotating anode x-ray tube.
2. Describe in detail natural and artificial radioactivity.
3. With neat graphs explain in detail the factors affecting the quality and quantity of x-rays.

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

1. Electromagnetic spectrum.
2. Principle and working of computed tomography (CT).
3. Magnetic effect of current.
4. Atom and its constituents.
5. Electron capture and internal conversion.
6. Construction of x-ray film.
7. Quantum theory of radiation.
8. Image intensifier.

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

1. Filters used in x-ray tube.
2. Define electric potential and give its unit.
3. Image unsharpness.
4. Define specific activity and give its unit.
5. Define tenth value thickness (TVT).
6. Define optical density.
7. Define fluorescence.
8. Single photon emission computed tomography (SPECT).
9. Image sequencing in Magnetic Resonance Imaging.
10. Difference between isotope and isobars.

B.Sc. RADIOTHERAPY TECHNOLOGY

FIRST YEAR

**PAPER II – BASIC PHYSICS, RADIATION PHYSICS AND BASIC OF
CLINICAL RADIOGRAPHY/IMAGING**

Q.P. Code: 801907

Time: Three Hours

Maximum: 100 Marks

Answer all questions

I. Elaborate on:

(3 x 10 = 30)

1. What are the different interactions of x-rays and gamma rays with matter? Explain any two in detail.
2. Give the principle of fluoroscopy and explain the construction and working of an image intensifier.
3. Elaborate on the principle of Magnetic Resonance Imaging (MRI) and the instrumentation required to produce an MRI image.

II. Write notes on:

(8 x 5 = 40)

1. Relationship between wavelength, Frequency and Energy.
2. Differences between Magnetic Resonance Imaging and Computerized Tomography.
3. Construction and working of nuclear fission reactor.
4. Continuous x-ray spectrum.
5. Multi-section radiography.
6. Film processing.
7. Importance of filters in an x-ray tube.
8. Photoelectric absorption.

III. Short answers on:

(10 x 3 = 30)

1. Pair production.
2. Linear energy transfer (LET).
3. Define Specific activity. Give its unit.
4. Mass attenuation coefficient.
5. Define Half value thickness (HVT).
6. State Joule's law with an example.
7. Positron emission tomography (PET).
8. Coherent scattering.
9. Define isotope. Give an example.
10. State Coulomb's law.

**B.Sc. RADIOTHERAPY TECHNOLOGY
FIRST YEAR
PAPER II – BASIC PHYSICS, RADIATION PHYSICS & BASIC OF CLINICAL
RADIOGRAPHY/IMAGING**

Q.P. Code: 801907

Time: Three Hours

Maximum: 100 Marks

Answer all questions

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

1. Describe in detail Galvanometer, voltmeter, ammeter and multimeter.
2. Describe in detail natural and artificial radioactivity.
3. Explain in detail about the different type of interaction of X and Gamma radiation with matter.

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

1. Nuclear fusion.
2. Exponential decay of radioactivity.
3. Factors affecting the fluoroscopic image.
4. Explain in details about contrast, film speed and Latitude.
5. Advantages and disadvantages of MRI.
6. Radiographic film.
7. Magnetic effect of current.
8. Write notes on periodic table.

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

1. Safe light.
2. Heel effect.
3. Define fluorescence.
4. Fog and noise.
5. What is SPECT?
6. Natural and artificial radioactivity.
7. Define Isotope and Isobar.
8. Pair production.
9. HVL.
10. Half value layer.

B.Sc. RADIOTHERAPY TECHNOLOGY

FIRST YEAR

**PAPER II – BASIC PHYSICS, RADIATION PHYSICS & BASIC OF
CLINICAL RADIOGRAPHY/IMAGING**

Q.P. Code: 801907

Time: Three Hours

Maximum: 100 Marks

Answer all questions

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

1. Describe the construction and working of Modern X-ray tube.
2. Discuss Photo-electric absorption, Compton scattering and pair production process.
3. Explain in detail film processing method. Explain the effects of temperature and development time in film processing.

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

1. Electromagnetic spectrum.
2. Quantum theory of radiation.
3. Explain the principle of fluoroscopy. Explain the construction of the image intensifier.
4. Alpha and Beta decay with examples.
5. Types of radioactive decay with examples.
6. Basic principles of MRI and imaging methods.
7. Difference between CT and MR images.
8. Bremsstrahlung X-ray spectrum.

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

1. Bio effects of MRI.
2. Optical density.
3. Define tenth value thickness (TVT).
4. Linear attenuation coefficient.
5. Ohms law.
6. PET CT.
7. Define one joule.
8. Transformer.
9. Image unsharpness.
10. Constituents of atom.

B.Sc. RADIOTHERAPY TECHNOLOGY

FIRST YEAR

**PAPER II – BASIC PHYSICS, RADIATION PHYSICS & BASIC OF
CLINICAL RADIOGRAPHY/IMAGING**

Q.P. Code: 801907

Time: Three Hours

Maximum: 100 Marks

Answer all questions

I. Elaborate on:

(3 x 10 = 30)

1. Describe the constituents of fixer and developer. Explain the automatic film processing.
2. With neat graphs explain in detail the factors affecting the quality and quantity of X-rays.
3. Explain computed tomography with suitable diagram.

II. Write notes on:

(8 x 5 = 40)

1. Explain about the measurement of beam quality.
2. Dark room.
3. Explain CCD and CRT monitors.
4. What is isotope, isotone and isobar? Give example.
5. Step up and step down transformer.
6. Ionization and excitation.
7. Electron capture and internal conversion.
8. Image intensifier.

III. Short answers on:

(10 x 3 = 30)

1. Electromagnetic spectrum.
2. Hysteresis loss.
3. SI units of work, force, power and energy.
4. Linear attenuation coefficient.
5. Define atomic number and mass number.
6. Define half life of radioactivity materials.
7. Fluoroscopy.
8. Characteristic X-ray.
9. Filters used in X-ray tube.
10. Image sequencing in magnetic resonance imaging.

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

[AHS 0321]

MARCH 2021

Sub. Code: 1907

(AUGUST 2020 EXAM SESSION)

B.Sc. RADIOTHERAPY TECHNOLOGY

FIRST YEAR (Regulations 2014-2015)

**PAPER II – BASIC PHYSICS, RADIATION PHYSICS & BASIC OF
CLINICAL RADIOGRAPHY/IMAGING**

Q.P. Code : 801907

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on:

(3 x 10 = 30)

1. Discuss in detail about the rotating anode x-ray tube and list down its advantages and applications.
2. Compare and contrast manual and automatic film processing and explain about the effects of temperature and development time in manual film processing.
3. What is MRI? Write down the parts of MR system. Compare and contrast CT and MR image.

II. Write notes on:

(8 x 5 = 40)

1. Write a note on filters and their types.
2. Explain about pair production and discuss about its application in imaging.
3. Define HVT and TVT and derive a relationship between both.
4. Draw an atom and explain about its constituents.
5. Write about the principle of working of Computed tomography.
6. Explain about the safety measures to be followed in dark room.
7. Nuclear fusion.
8. Explain about alpha and beta decay with examples.

III. Short answers on:

(10 x 3 = 30)

1. Difference between Fog and noise.
2. Write down the SI units for force, work, energy and temperature.
3. Electron capture.
4. Heel effect.
5. What is a transformer?
6. Ammeter.
7. Joule's law
8. Define Specific activity.
9. Mass attenuation coefficient.
10. What is SPECT? Where it is used?

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

[AHS 0422]

APRIL 2022

Sub. Code: 1907

(FEBRUARY 2021 & AUGUST 2021 EXAM SESSION)

B.Sc. RADIOTHERAPY TECHNOLOGY

FIRST YEAR (Regulations 2014-2015)

**PAPER II – BASIC PHYSICS, RADIATION PHYSICS AND BASIC OF
CLINICAL RADIOGRAPHY/IMAGING**

Q.P NO. 801907

Time: Three Hours

Answer All questions

Maximum: 100 Marks

I. Elaborate on :

(3X10=30)

1. Explain in detail any three types of interaction of radiation with matter.
2. Explain the working principle and construction of rotating anode X ray tube with neat diagram.
3. Explain in detail the different regions of electromagnetic spectrum with their respective wavelength and energy.

II. Write Notes on :

(8X5=40)

1. Discuss the physical characteristics of any three radioisotopes used in medicine which are produced from the nuclear reactor.
2. Explain the types and effects of filtration in X ray tube.
3. Explain and draw the circuit diagram to control the mA of X ray unit.
4. Draw the decay scheme for electron capture and internal conversion.
5. Explain the effect of temperature and development time on image formation in X ray film.
6. What are the factors affecting the fluoroscopic image?
7. Explain how slice selection is performed during MRI.
8. Explain the basic principle of PET CT.

III. Short Answers on :

(10X3=30)

1. Ionization & Excitation.
2. Atomic Structure.
3. Capacitor & Capacitance.
4. What is Specific activity?
5. What is HVT & TVT?
6. What is Linear attenuation coefficient?
7. Name any two imaging sequences used in MRI.
8. Image resolution.
9. What is electric potential?
10. Write down the relationship between work and force.

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

[AHS 1122]

NOVEMBER 2022

Sub. Code: 1907

B.Sc. RADIOTHERAPY TECHNOLOGY

FIRST YEAR (Regulation 2014-2015)

**PAPER II – BASIC PHYSICS, RADIATION PHYSICS & BASIC OF CLINICAL
RADIOGRAPHY/IMAGING**

Q. P. Code: 801907

Time: Three hours

Maximum : 100 Marks

Answer ALL Questions

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

1. Write in detail the principle, construction and working of a rotating anode X-ray tube.
2. Write an essay on X-ray film construction and film characteristics.
3. Explain the process of alpha, beta and gamma decay with suitable examples.

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

1. Write notes on electromagnetic spectrum.
2. Excitation and ionization.
3. Step up and step down transformer.
4. Explain Linear and mass attenuation coefficients, HVT and TVT.
5. Compton effect.
6. Distinguish between continuous spectrum and characteristic spectrum.
7. Factors affecting the fluoroscopic image.
8. Electron capture and internal conversion.

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

1. SI unit of Temperature.
2. Define Isotope and Isomer.
3. Heel effect.
4. Relationship between Wavelength, Frequency and Energy.
5. Fog and noise.
6. Tube voltage.
7. Coulomb's law.
8. Half-life.
9. Nucleon.
10. Image Intensifier.

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

[AHS 0423]

APRIL 2023

Sub. Code: 1907

**B.Sc. RADIOTHERAPY TECHNOLOGY
FIRST YEAR (Regulation 2014-2015 onwards)
PAPER II – BASIC PHYSICS, RADIATION PHYSICS & BASIC OF CLINICAL
RADIOGRAPHY/IMAGING
Q.P. Code: 801907**

Time: Three Hours

Answer All questions

Maximum: 100 Marks

I. Elaborate on :

(3 X 10 = 30)

1. Describe production of X-ray with neat diagram.
2. Explain the basic principle of image formation in Magnetic Resonance Imaging.
3. With neat diagram, explain the principle and construction of Image Intensifier Fluoroscopy.

II. Write notes on:

(8 x 5 = 40)

1. Artificial radioactivity.
2. Explain the factors affecting the quality and quantity of X-rays.
3. Explain and draw the circuit diagram to control the kVp of X-ray unit.
4. Draw the decay scheme for Beta and Gamma emission.
5. Explain the interaction of charged particle with matter.
6. Characteristic curve of X-ray film.
7. Write down the differences between the CT and MRI.
8. Explain the basic principle of Single Photon Emission Computed Tomography.

III. Short answers on:

(10 x 3 = 30)

1. Relationship between Energy and Wavelength.
2. What are Isotopes and Isobars?
3. Atomic number and Mass number.
4. Biological effects of MRI.
5. What is direct fluoroscopy?
6. What is mass attenuation coefficient?
7. Define half life with examples.
8. Write Ohm's law and Joules law.
9. Hysteresis losses.
10. What is Coulomb's law?

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

[AHS 1123]

NOVEMBER 2023

Sub. Code: 1907

B.Sc. RADIOTHERAPY TECHNOLOGY

FIRST YEAR (Regulation 2014-2015 onwards)

PAPER II – BASIC PHYSICS, RADIATION PHYSICS & BASIC OF CLINICAL RADIOGRAPHY/IMAGING

Q.P. Code: 801907

Time: Three Hours

Answer All questions

Maximum: 100 Marks

I. Elaborate on :

(3X10=30)

1. Explain in detail about the different type of Interaction of X and Gamma Radiation with matter.
2. Computed Tomography with suitable diagram.
3. Explain the process of Alpha decay, Beta decay and Gamma decay with suitable examples.

II. Write notes on :

(8X5=40)

1. Quality and Intensity of X-rays.
2. X-ray film construction.
3. Image intensifier tube.
4. Electromagnetic spectrum.
5. Factors affecting the Fluoroscopic image.
6. Latent Image.
7. Tomography.
8. Film processing.

III. Short answers on :

(10X3=30)

1. Ohms laws of Electricity.
2. Linear attenuation co-efficient.
3. Define Half-life of Radioactive materials.
4. Define isotope and isobar.
5. What is Image quality?
6. Fog and Noise.
7. Hysteresis losses.
8. What is Thermionic emission?
9. Filters used in X-ray tube.
10. Define Fluorescence.
