[KZ 0811] **AUGUST 2011** **Sub. Code: 2103**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

FIRST YEAR

PAPER III – BASIC PHYSICS AND NUCLEAR PHYSICS

Q.P. Code: 802103

Time : Three Hours **Maximum : 100 marks**

Answer ALL questions

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

1. Describe the different process of radiation decay. Compare the properties of alpha, beta and gamma rays.
2. What are the interactions of radiation with matter? Describe any two of them in detail.
3. Discuss at length
   a) Derive the relationship between decay constant and half life
   b) Radio isotopes used in Nuclear Medicine with type of emission and application for each.

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

1. Properties of Electromagnetic radiation.
2. Photoelectric effect.
3. What will be the activity of a radioactive substance after 4 half lives if the initial activity is 200 Ci?
4. Binding forces between nuclear particles.
5. Briefly describe about the total attenuation coefficient and give its Clinical importance.
6. Define with units a) Absorbed dose b) Effective dose and c) Equivalent Dose.
7. Principle, construction and working of a moving coil galvanometer.
8. Describe the factors affecting the quality of radiation.

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

1. Properties of gamma rays.
2. Voltmeter.
3. Joule’s law.
4. Electromagnetic radiation spectrum.
5. Half life.
6. Give two differences between Alpha rays and Beta rays.
7. Attenuation and absorption.
8. Electromagnetic spectrum.
9. Fluorescence and Phosphorescence.
10. State Inverse square law.

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[LA 0212] **FEBRUARY 2012** **Sub. Code: 2103**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

FIRST YEAR

PAPER III – BASIC PHYSICS AND NUCLEAR PHYSICS

Q.P. Code: 802103

Time : Three Hours **Maximum : 100 marks**

Answer ALL questions

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

1. What is radioactivity? Derive the decay equation $N = Noe(-\lambda t)$.
2. Describe with a neat diagram the construction and working of a moving coil galvanometer. Describe how it can be converted into an ammeter and voltmeter.
3. Write notes on the following:
   a) Compton effect b) Photoelectric effect c) Pair production.

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

1. Derive half life of the radioactive source.
2. Fluorescence and Phosphorescence.
3. Direct current and alternating current.
4. Properties of x-rays.
5. The exposure rate at 1 meter distance from a radioactive source is measured as 200 R/hr. What will be the exposure rate at a distance of (i) 2 meters (ii) half a meter?
6. Artificial radioactivity.
7. Electromagnetic induction.
8. Radio isotopes used in Nuclear Medicine.

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

1. Ionization.
2. Ohm’s law.
3. Half Value Layer.
4. Linear attenuation coefficient.
5. Inverse square law.
6. Electron volt.
7. Photon.
8. Roentgen.
9. Lead equivalence.
10. Decay constant.

****

[LB 0212] **AUGUST 2012** **Sub. Code: 2103**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

FIRST YEAR

PAPER III – BASIC PHYSICS AND NUCLEAR PHYSICS

Q.P. Code : 802103

Time : Three hours **Maximum : 100 marks**

(180 Mins) Answer ALL questions in the same order.

I. Elaborate on:	**Pages (Max.)**	**Time (Max.)**	**Marks (Max.)**
1. Describe the mechanisms of radioactive decay. Compare the properties of alpha, beta and gamma rays.	7	20	10
2. Explain a) electric charge b) electric potential c) electric current.	7	20	10
3. Explain Photoelectric effect, Compton effect and Pair-Production process and discuss the relative importance of each at various photon energies.	7	20	10
II. Write notes on:			
1. Periodic Table.	4	10	5
2. Fluorescence and Phosphorescence.	4	10	5
3. Binding energy.	4	10	5
4. What is meant by isotopes? Give examples.	4	10	5
5. Physical, biological and effective half life.	4	10	5
6. Derive $N = N_o e^{(-\lambda t).}$	4	10	5
7. Direct current and alternating current.	4	10	5
8. Define with units a) Absorbed dose b) Effective dose c) Equivalent Dose.	4	10	5
III. Short Answers on:			
1. Radiation.	2	4	3
2. Atom.	2	4	3
3. Difference between X-rays and Gamma rays.	2	4	3
4. Define Becquerel and Curie.	2	4	3
5. Joule's law.	2	4	3
6. Linear attenuation coefficient.	2	4	3
7. What will be the activity of a radioactive substance after 3 half lives if the initial activity is 120 Ci.	2	4	3
8. Isomeric Transition.	2	4	3
9. Ohm's law.	2	4	3
10. Voltmeter.	2	4	3

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[LD 0212] **AUGUST 2013** **Sub.Code :2103**

B.SC. NUCLEAR MEDICINE TECHNOLOGY
FIRST YEAR
PAPER –I – BASIC PHYSICS AND NUCLEAR MEDICINE PHYSICS

Q.P. Code: 802103

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

Answer All questions

I Elaborate on: **(3x10 =30)**

1. Different radioactive decay modes
2. Interaction of X-rays and γ-rays with matter
3. Mass energy equivalence

II. Write Notes on: **(8x5=40)**

1. Half life
2. Linear Attenuation coefficient
3. Alpha particles
4. Radioactivity
5. Law of exponential attenuation
6. Decay factor
7. Bohr atom model
8. Fluorescence

III. Write short answers on: **(10x3=30)**

1. SI unit of energy
2. Atomic number
3. Nuclear binding energy
4. Unit of electric charge
5. Voltmeter
6. Ionization
7. Isotopes
8. Excited state
9. Coulomb force
10. Radiation exposure

*****

[LE 0212] **FEBRUARY 2014** **Sub.Code: 2103**

B.SC. NUCLEAR MEDICINE TECHNOLOGY
FIRST YEAR
PAPER –I – BASIC PHYSICS AND NUCLEAR MEDICINE PHYSICS

Q.P. Code: 802103

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

Answer All questions

I. Elaborate on: **(3x10 =30)**

1. Alpha decay, beta decay, electron capture and gamma decay
2. Different atomic models used to explain atomic structure
3. Different types of radiation detectors

II. Write Notes on: **(8x5=40)**

1. Different types of radiation
2. Nucleus of an atom
3. Joules law
4. Ammeter
5. Total attenuation coefficient
6. Radiation absorbed dose
7. Typical energy spectrum of particles emitted from a radionuclide
8. Discoverer of X-ray and the year of discovery

III. Wrote short answers on: **(10x3=30)**

1. Discoverer of natural radioactivity and the year of discovery
2. Electric charge of proton
3. Mass of neutron
4. Relationship between mCi and μCi
5. Ohms law
6. Scintillation detectors
7. Isobar
8. The unit of nuclear binding energy
9. Decay scheme
10. Decay constant

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[LF 0212] **AUGUST 2014** **Sub.Code :2103**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

FIRST YEAR

PAPER – III BASIC PHYSICS & NUCLEAR PHYSICS

Q.P. Code: 802103

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

Answer All questions

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

1. Binding forces between Nuclear Particles
2. Compton Scattering & Pair Production
3. Mechanism of Radioactive Decay with Examples

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

1. Artificial Radioactivity
2. Electromagnetic Effect
3. Luminescence
4. Atomic Models
5. Mass Energy Equivalence
6. Ammeter & Multimeter
7. Total attenuation coefficient
8. Photoelectric Effect

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

1. Electric Charge
2. Resistance
3. Ohms law
4. Joules law
5. Electric Power
6. Voltmeter
7. Alpha rays
8. x Rays
9. TVL
10. Decay factor

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[LG 0215] **FEBRUARY 2015** **Sub.Code :2103**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

FIRST YEAR

PAPER III – BASIC PHYSICS AND NUCLEAR PHYSICS

Q.P. Code: 802103

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

Answer All questions

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

1. Electromagnetic Spectrum.
2. Photoelectric effect and Compton scattering.
3. Natural Radioactivity.

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

1. Exposure.
2. Artificial radioactivity.
3. Half Life.
4. Pair Production.
5. Joule 's law.
6. Properties of X rays.
7. Binding forces between nuclear particles.
8. Bohr's atom model.

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

1. Isobars.
2. Curie.
3. Becquerel.
4. Gray.
5. Ohm's law.
6. Linear attenuation coefficient.
7. Coulomb’s law.
8. Decay factor.
9. Tc99m.
10. Electricity.

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[LH 0815] **AUGUST 2015** **Sub.Code :2103**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

FIRST YEAR

PAPER III – BASIC PHYSICS AND NUCLEAR PHYSICS

Q.P. Code: 802103

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

Answer All questions

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

1. Explain different Radioactive decay.
2. Explain Different types of Radiation Detectors.
3. Explain different types of Radiation Interactions with matter and its important.

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

1. Half value Layer.
2. Electromagnetic Induction.
3. Isotope and Isobar.
4. Joules Law.
5. Voltmeter and Ammeter.
6. Inverse Square Law.
7. Decay Constant.
8. Biological Half Life.

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

1. Alpha Ray.
2. Unit of nuclear energy.
3. Resistance.
4. Isobar.
5. Electric power.
6. Pair Production.
7. Half Life of Co-60.
8. Discoverer of Radium.
9. Mass of proton.
10. Radiation Exposure unit.

****

[LI 0216] FEBRUARY 2016 **Sub.Code :2103**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

FIRST YEAR

PAPER III – BASIC PHYSICS AND NUCLEAR PHYSICS

Q.P. Code: 802103

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

Answer All questions

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

1. Explain different types of Radiation Interactions with matter and its important.
2. Explain Atomic Structure and it's Models.
3. Explain the Mechanisms of Radioactive Decay.

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

1. Electromagnetic Induction.
2. Ohms Law.
3. Biological Half Life.
4. Radiation Exposure.
5. Voltmeter and Ammeter.
6. State SI Unit for Radioactivity.
7. Radiation Intensity.
8. Photoelectric Effect.

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

1. Radiation Exposure Unit.
2. Electric Charge.
3. Mass Number.
4. Ionization.
5. Isomer.
6. Shielding Material for Beta particle.
7. Half life of Tc-99m.
8. Mass of Neutron.
9. Exponential Decay.
10. Unit for Radiation Absorption.

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[LJ 0816] AUGUST 2016 **Sub. Code: 2103**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
FIRST YEAR
PAPER III – BASIC PHYSICS AND NUCLEAR PHYSICS

Q.P. Code: 802103

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

Answer all questions

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

1. Describe in detail the mechanisms of radioactive decay.
2. What are the interactions of radiation with matter? Describe any two of them in detail.
3. Discuss in detail radioisotopes used in Nuclear Medicine with type of emission and application for each.

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

1. Write the properties of electromagnetic radiation.
2. What will be the activity of a radioactive substance after 4 half-lives if the initial activity is 100 mCi?
3. Explain artificial radioactivity.
4. Define: Isotope, Isomer, Isobar and Isotone and give an example for each.
5. Electromagnetic induction.
6. Decay scheme of Tc-99m and Iodine-131.
7. Binding forces between nuclear particles.
8. Direct current and alternating current.

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

1. Define the term “Radiation”.
2. Voltmeter.
3. Joule’s law.
4. Half-life.
5. Difference between X-rays and gamma rays.
6. Attenuation and absorption.
7. Photon.
8. Electron volt.
9. Luminescence.
10. Half Value Layer.

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[LK 0217] FEBRUARY 2017 **Sub. Code: 2103**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
FIRST YEAR
PAPER III – BASIC PHYSICS AND NUCLEAR PHYSICS

Q.P. Code: 802103

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

Answer all questions

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

1. Different atomic models used to explain atomic structure.
2. Describe with a neat diagram the construction and working of a moving coil galvanometer and how it can be converted into an ammeter or voltmeter?
3. Describe the instruments voltmeter, ammeter and multimeter.

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

1. What will be the activity of a radioactive substance after 4 half-lives if the initial activity is 100 mCi?
2. Linear Attenuation coefficient.
3. Fluorescence and phosphorescence.
4. Annihilation process.
5. Compton effect.
6. Decay scheme of Tc-99m and Iodine-131.
7. Derive $N = N_o e^{(-\lambda t)}$.
8. Direct current and alternating current.

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

1. Nuclear binding energy.
2. Electron Volt.
3. Ionization.
4. Isobar and Isomer.
5. Photon.
6. Internal conversion.
7. Define the term “Radiation”.
8. Ohms law.
9. Electrical resistance.
10. Half Value layer.

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[LL 0817] AUGUST 2017 **Sub. Code: 2103**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
FIRST YEAR
PAPER III – BASIC PHYSICS AND NUCLEAR PHYSICS

Q.P. Code: 802103

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

Answer all questions

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

1. Define physical, biological and effective half-life of a radioactive substance. Derive the equation of effective Half-life.
2. What are the subatomic particles? Describe each one in detail.
3. Define radioactive decay. Compare the properties of alpha, beta and gamma rays.

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

1. Derive the equation for radioactive decay $A = A_o e^{(-\lambda t)}$.
2. What is meant by isotopes and radio nuclides? Give examples.
3. Explain the phenomena of Fluorescence and phosphorescence.
4. Difference between Gamma rays and X-rays.
5. The exposure rate from a radioactive material at 1 meter distance is 100 mR/hr. What will be the exposure rate at a distance of a) 2 meter b) 0.5 meter.
6. Binding forces between Nucleons.
7. Structure of atom.
8. Electrostatic forces.

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

1. Inverse square law.
2. Units of voltage, electric current and resistance.
3. Pair production.
4. Mass attenuation coefficient.
5. Shielding material for β radiation.
6. Ionization and excitation.
7. Tenth value layer.
8. Electromagnetic radiation.
9. State Coulomb's law.
10. What is isomeric transition? Give one example.

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[LN 0818] AUGUST 2018 **Sub. Code: 2103**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
FIRST YEAR
PAPER III – BASIC PHYSICS AND NUCLEAR PHYSICS

Q.P. Code: 802103

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

Answer all questions

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

1. State the law of Radioactive disintegration. Derive the equation of radioactive decay.
2. What are the interactions of gamma radiation with matter? Describe any two of them with suitable examples.
3. Define: Isotope, Isobar, Isotone and Isomer. Give at least two examples for each.

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

1. Half-life and mean life of a radionuclide.
2. State and explain Inverse Square law.
3. Decay constant.
4. Beta Decay.
5. What will be the activity of a radioactive substance after 3 half-lives if the initial activity is 200 mCi?
6. Nuclear binding force.
7. Direct current and alternating current.
8. Natural and artificial radioactivity.

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

1. Electron Volt.
2. Nucleons.
3. Linear attenuation co-efficient.
4. Units of radiation exposure.
5. Units radioactivity.
6. Subatomic particles.
7. Half value layer.
8. Ideal shielding material for gamma radiation.
9. State Ohm’s law.
10. Capacitance.

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[LP 0819] AUGUST 2019 **Sub. Code: 2103**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

FIRST YEAR

PAPER III – BASIC PHYSICS & NUCLEAR PHYSICS

Q.P. Code: 802103

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

Answer all questions

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

1. Explain Compton scattering and pair production.
2. Explain the types of Radioactive decay.
3. Explain on Mass energy equivalence.

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

1. Inverse Square Law.
2. Half life of Tc-99m.
3. Voltmeter & Ammeter.
4. Fluorescence.
5. Electromagnetic Induction.
6. Coloumb Law.
7. Radiation Intensity.
8. Photoelectric effect.

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

1. Unit for radiation absorption.
2. Resistance.
3. Nucleus particles.
4. Isobar.
5. Ionisation.
6. Shielding material for Gamma.
7. Relationship of GBq and Ci.
8. Excited State.
9. Half Life of I-121.
10. Istope.

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[LQ 0220] FEBRUARY 2020 **Sub. Code: 2103**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

FIRST YEAR

PAPER III – BASIC PHYSICS & NUCLEAR PHYSICS

Q.P. Code: 802103

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

Answer all questions

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

1. Explain nuclear structure and atomic models.
2. Explain the mechanisms of radioactive decay.
3. Explain types Interaction of radiation with matter and its important.

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

1. Isotope and Isomer.
2. Electromagnetic Induction.
3. Decay constant.
4. Tenth value layer.
5. Calculate heat produced in a circuit having 5 Ohms resistor, when conducts 3mA current for 30 min.
6. State natural and artificial radioactive sources.
7. Fluorescence.
8. Ohms law.

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

1. Half-life of Cs-137.
2. Inert gases in periodic table.
3. Unit for radiation exposure.
4. Pair production.
5. Coloumb force.
6. Mass number.
7. Half life of Tc-99m.
8. Shielding material for beta particle.
9. Mass number.
10. Ionization.

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

[AHS 0321] MARCH 2021 Sub. Code: 2103

(AUGUST 2020 EXAM SESSION)

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

FIRST YEAR (Regulations 2010-2011)

PAPER III – BASIC PHYSICS & NUCLEAR PHYSICS

Q.P. Code : 802103

Time: Three hours **Answer ALL Questions** **Maximum: 100 Marks**

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

1. Explain the Electromagnetic spectrum.
2. Explain Interaction Radiation with matter and its important.
3. Explain X-ray production.

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

1. Half value layer.
2. Electromagnetic Induction.
3. Isotope and Isomer.
4. Decay constant.
5. Linear Attenuation coefficient.
6. Ohm's Law.
7. Biological Half life.
8. State Natural and artificial radioactive sources.

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

1. Discoverer of X-ray.
2. Unit of electric charge.
3. Mass of Neutron.
4. Alpha Ray.
5. Shielding material for Alpha particle.
6. Relationship of rad and grey.
7. Difference between Gamma and X-ray.
8. Half life of Tc-99m.
9. Inert Gases.
10. Biological Half Life.

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

[AHS 0422] APRIL 2022 Sub. Code: 2103

(FEBRUARY 2021 & AUGUST 2021 EXAM SESSIONS)

B.Sc. NUCLEAR MEDICINE TECHNOLOGY

FIRST YEAR (Regulations 2010-2011)

PAPER III – BASIC PHYSICS & NUCLEAR PHYSICS

Q.P NO. 802103

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

Answer All questions

I. Elaborate on: **(3 x10 = 30)**

1. Explain different types of radiation detector.
2. Describe atomic models used to explain atomic structure.
3. Describe the instruments –voltmeter, ammeter, and multimeter.

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

1. Electromagnetic induction.
2. Decay scheme of Tc99 and I131.
3. Half value layer.
4. Decay constant.
5. Joule's law.
6. Total attenuation coefficient.
7. State Inverse square law.
8. Photoelectric effect.

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

1. Photon.
2. Spectrum of nonionizing radiation.
3. Internal conversion.
4. Electrical resistance.
5. Capacitance.
6. Pair production.
7. What is isomeric transition? Give one example.
8. Give two differences between Alpha rays and Beta rays.
9. Coulomb force.
10. Mass of proton.

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

[AHS 0423] APRIL 2023 Sub. Code: 2103

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
FIRST YEAR (Regulations 2010-2011 & 2018-2019 onwards)
PAPER III – BASIC PHYSICS & NUCLEAR PHYSICS
Q. P. Code: 802103

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

Answer ALL Questions

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

1. Write in detail about types of interaction of electromagnetic radiation with matter, explain them with suitable equation, diagrams and examples.
2. Describe the different processes of radiation decay. Compare the properties of alpha, beta and gamma rays.
3. Explain atomic structure and its models.

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

1. Relation between HVT and TVT. Write the HVT of any three radionuclide used in Nuclear Medicine.
2. Capacitance.
3. How is Bremsstrahlung produced? Does its production increase or decrease with increasing kinetic energy of the electron and atomic number of the absorber?
4. Ammeter and Multimeter.
5. What is the relation between absorbed does and equivalent dose? Also write the unit of absorbed dose and equivalent dose.
6. If 5.0×10^{18} atoms decay with a half-life of 2.3 years, how many are remaining after 4.7 years?
7. Differentiate self and mutual induction.
8. What is Radioactivity? Derive the decay equation $A = A_0 e^{(-\lambda t)}$.

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

1. Explain law of exponential attenuation.
2. List three properties of electro magnetic radiation.
3. Periodic table.
4. Explain annihilation reaction.
5. Differentiate Kerma and Exposure.
6. The transformer losses.
7. If the exposure rate at 5 meters from a radioactive source is 15mR/hour, what will be the exposure rate be at 20 meters?
8. State Faraday's laws of electromagnetic induction.
9. Define physical half-life, biological and effective half-life.
10. Define conductor and insulator based on electrical conductivity. Give its examples.

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

[AHS 1123] **NOVEMBER 2023** **Sub. Code: 2103**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
FIRST YEAR (Regulations 2010-2011& 2018-2019 onwards)
PAPER III – BASIC PHYSICS & NUCLEAR PHYSICS
Q.P. Code: 802103

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

Answer All questions

I. Elaborate on: **(3 x10 = 30)**

1. Define physical, biological and effective half-life of a Radioactive substance. Derive the equation of effective half-life.
2. Define Radioactive decay. Compare the properties of Alpha, Beta and Gamma Rays.
3. What are the Interactions of Radiation with matter? Describe any two of them in detail.

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

1. Explain the phenomena of Fluorescence and phosphorescence.
2. Annihilation process.
3. Describe $N_t = N_0 e^{(-\lambda t)}$.
4. Direct current and alternating current.
5. Compton effect.
6. What is meant by isotopes and Radionuclides? Give examples.
7. Differences between gamma rays and X-rays.
8. Electrostatic forces.

III. Write short notes on: **(10 x 3 = 30)**

1. SI unit of energy.
2. Atomic number.
3. Unit of electrical charge.
4. TVL.
5. Ohm's law.
6. Isobar.
7. Isotones.
8. Attenuation and absorption.
9. Discoverer of Radium.
10. Radiation exposure unit.

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

[AHS 1125] **NOVEMBER 2025** **Sub. Code: 2103**

B.Sc. NUCLEAR MEDICINE TECHNOLOGY
FIRST YEAR (Regulations 2010-2011 & 2018-2019 onwards)
PAPER III – BASIC PHYSICS & NUCLEAR PHYSICS
Q.P. Code: 802103

Time: Three Hours **Answer All questions** **Maximum: 100 Marks**

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

1. What are the subatomic particles? Describe each in detail.
2. Define Radioactive Decay. Compare the properties of Alpha, Beta and Gamma Rays.
3. Explain the binding forces between Nuclearparticles.

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

1. Law of Exponential attenuation.
2. Bohr's atomic model.
3. Decay factor.
4. What will be the activity of a Radioactive substance after 3 half-lives if theinitial activity is 200 mCi?
5. Describe the factors affecting the quality of Radiation.
6. Artificial Radioactivity.
7. Periodic table.
8. Discoverer of X-ray and the year of discovery.

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

1. Mass attenuation effect.
2. Shielding material of Beta Radiation.
3. Alpha rays.
4. Ionization.
5. Define the term "Radiation".
6. Relationship between mCi and μCi.
7. Scintillation detectors.
8. Linear attenuation coefficient.
9. Units of voltage, electric current and resistance.
10. Subatomic particles.

*****