

May 2011

[KY 011]

Sub. Code: 4011

M.Sc (MEDICAL PHYSICS) DEGREE EXAMINATION
(Revised Regulations for Candidates admitted from 2010-2011)

FIRST YEAR

Paper I – RADIATION PHYSICS

Q.P. Code : 284011

Time : Three hours

Maximum :100marks

Answer All questions.

I. Elaborate on :

(2 x 20 = 40)

1. Natural and artificial radioactivity
2. Interaction of ionizing radiation with matter.

II. Write notes on :

(10 x 6 = 60)

1. Binding energy
2. Autotransformers
3. Half-value layer
4. Ohm's law
5. Relative biological effectiveness (RBE)
6. Electron volt
7. Cerenkov radiation
8. Bragg curve
9. Electronic equilibrium
10. Atomic nucleus

May 2012

[LA0512]

Sub.code:4011

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION- MAY 2012

**FIRST YEAR
RADIATION PHYSICS
Q.P. Code: 284011**

**Time: Three hours
(180Min)**

Answer All questions

Maximum: 100 Marks

I. Elaborate on:

**Pages Time Marks
(Max) (Max) (Max)**

- | | | | |
|--|----|----|----|
| 1. Describe in detail about interaction of ionizing radiation with matter and importance of these interaction. | 17 | 40 | 20 |
| 2. Discuss the various methods of radioactive decay. | 17 | 40 | 20 |

II. Write Notes on:

- | | | | |
|--|---|----|---|
| 1. Properties of alpha, beta and gamma radiation. | 4 | 10 | 6 |
| 2. Ionization and excitation. | 4 | 10 | 6 |
| 3. Bohr's atomic model. | 4 | 10 | 6 |
| 4. Energy transfer and energy co-efficient. | 4 | 10 | 6 |
| 5. Isotopes, Isobars, Isotones and Isomers. | 4 | 10 | 6 |
| 6. Bremsstrahlung and characteristics radiation. | 4 | 10 | 6 |
| 7. Bragg curve. | 4 | 10 | 6 |
| 8. Cerenkov radiation. | 4 | 10 | 6 |
| 9. Radiation quality factor and Tissue weighting factor. | 4 | 10 | 6 |
| 10. Mass defect and Binding energy. | 4 | 10 | 6 |

[LB 1012]

OCTOBER 2012

Sub. Code: 4011

M.Sc (MEDICAL PHYSICS) DEGREE EXAMINATION
(Revised Regulations for Candidates admitted from 2010-2011)

FIRST YEAR

PAPER I – RADIATION PHYSICS

Q.P. Code : 284011

Time : 3 hours
(180 Min)

Maximum : 100 marks

Answer ALL questions in the same order.

I. Elaborate on :

Pages Time Marks
(Max.)(Max.)(Max.)

- | | | | |
|--|----|----|----|
| 1. Derive the Bethe-Bloch formulae for mass collision stopping power for charged particles. | 17 | 40 | 20 |
| 2. (a) Describe the following nuclear transformations with suitable example.
(i) alpha decay (ii) beta-minus decay (iii) beta-plus emission
(b) Discuss briefly the neutron induced nuclear reactions. | 17 | 40 | 20 |

II. Write notes on :

- | | | | |
|---|---|----|---|
| 1. (a) Define Ohm's law and Coulomb's law of electric force.
(b) Discuss about the force on a current carrying conductor. | 4 | 10 | 6 |
| 2. What are electromagnetic radiation? Using inverse square law, calculate the exposure rate at 3 m distance from the source when the same is 100 mR/hr at 1m distance. | 4 | 10 | 6 |
| 3. What is radioactive equilibrium? Derive the condition for transient and secular equilibrium. | 4 | 10 | 6 |
| 4. Define the following (i) Energy Fluence (ii) Intensity (iii) LET (iv) sievert (v) Exposure (vi) Electronic Attenuation Coefficient. | 4 | 10 | 6 |
| 5. Explain the salient features of Rutherford's atomic model. | 4 | 10 | 6 |
| 6. Explain Compton scattering and its relevance to clinical applications. | 4 | 10 | 6 |
| 7. Describe briefly about Cerenkov radiation. | 4 | 10 | 6 |
| 8. Distinguish between Bremsstrahlung and Characteristic radiation. | 4 | 10 | 6 |
| 9. (a) Derive the relationship between roentgen and rad.
(b) Give the comparison between KERMA and Absorbed dose. | 4 | 10 | 6 |
| 10. Draw the depth dose curve and explain the spread of Bragg peak in clinical use. | 4 | 10 | 6 |

[LC 0413]

APRIL 2013

Sub. Code: 4011

**M.Sc (MEDICAL PHYSICS) DEGREE EXAMINATION
(Revised Regulations for Candidates admitted from 2010-2011)**

FIRST YEAR

PAPER I – RADIATION PHYSICS

Q.P. Code : 284011

Time : 3 hours

Maximum : 100 marks

I. Elaborate on:

(2x20=40)

1. The structure of atom, explain the atom models and electronic configuration.
Explain atomic mass number and mass units.
2. Passage of Heavy charged particles thro matter. Explain the methods of energy loss and write a note on Bragg curve.

II. Write notes on:

(10X6=60)

1. Work, force and energy.
2. Mass defect and atomic binding energy.
3. Mutual and self-induction.
4. Properties of alpha, beta and gamma radiation.
5. Photo-electric effect.
6. Transformers and Autotransformers.
7. Write on the methods of production of Radioisotopes.
8. Write a short note on Mass, electronic and atomic attenuation coefficients.
9. Pair production.
10. Neutron induces nuclear reaction.

[LD 1013]

OCTOBER 2013

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M.Sc (MEDICAL PHYSICS) DEGREE EXAMINATION
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FIRST YEAR

PAPER I – RADIATION PHYSICS

Q.P. Code : 284011

Time : 3 hours

Maximum : 100 marks

Answer ALL questions

I. Elaborate on :

(2X20=40)

1. Explain in detail Proton – Neutron theory of Nuclear Composition, packing fraction, mass defect and atomic binding energy.
2. Write in detail about Electromagnetic induction, mutual induction, Transformers, Auto transformer. Explain the application of auto transformer.

II. Write notes on :

(10X6=60)

1. Linear Energy Transfer (LET) and Relative Biological effectiveness (RBE)?
2. Write a short note on Nuclear Stability
3. Describe Gamow model of Alpha decay
4. What is Nuclear Isomerism?
5. Mass, electronic and atomic attenuation coefficients
6. What is meant by neutron activation?
7. Define Gray and KERMA and compare them.
8. Classical theory of inelastic collision
9. Write short note on Bremsstrahlung radiation
10. Explain Stopping power and Bragg curve
