

[LC 0413]

APRIL 2013

Sub. Code:4034

**M.Sc (MEDICAL PHYSICS - DEGREE EXAMINATION
SECOND YEAR**

PAPER IV – RADIATION SAFETY

Q.P. Code : 284034

Time : 3 hours

Maximum : 100 marks

I. Elaborate on:

(2X20=40)

1. Discuss in detail general considerations in Planning of Nuclear Medicine lab with a model layout
2. Write about the regulations applicable for different modes of transporting Radioactive substances. What are the Consignor's and carrier's responsibilities on transport of radioactive substances ?

II. Write notes on :

(10X6=60)

1. What are ALI & DAC ?
2. Radiation Protection survey of teletherapy unit
3. Write a note on the objective of Radiation Protection
4. Responsibilities of RSO in Diagnostic Radiology
5. Safety aspects of using ionizing radiation in Nucleonic Gauges
6. Write in detail about the sources of radioactive wastes and its classification.
7. Radioactive Decontamination Procedure of Unsealed Radioisotopes
8. Protocol for managing the Radioactive substances Transport emergencies
9. RPR 1971
10. ThermoLuminescent DosimeterA

[LD 1013]

OCTOBER 2013

Sub. Code: 4034

M.Sc., MEDICAL PHYSICS - DEGREE EXAMINATION

SECOND YEAR

PAPER IV – RADIATION SAFETY

Q.P. Code: 284034

Time : 3 hours

Maximum : 100 marks

I. Elaborate on:

(2X20=40)

1. Discuss in detail general considerations in Planning of Telecobalt Unit with a model layout
2. Write in detail about the procedure of handling, storage and Disposal of Radioactive material in Nuclear Medicine.

II. Write notes on :

(10X6=60)

1. Why “hydrogenous material” is preferred choice of material for neutron shielding?
2. AERB recommended Dose Limits for Radiation workers and public
3. Write a note on the objective of Radiation Protection
4. Responsibilities of RSO in Industrial Radiography
5. Safety aspects of using ionizing radiation in Blood agricultural research
6. Write in detail about the various types of Packages used in transporting radioactive material.
7. Area Monitoring in Brachytherapy facility
8. Discuss in detail general considerations in Planning of CT scan Unit
9. Radiation emergencies during Loading and Unloading of sources in Telecobalt machine.
10. Management of Radiation Injuries.

[LE 0414]

APRIL 2014

Sub. Code:4034

**M.Sc., MEDICAL PHYSICS - DEGREE EXAMINATION
SECOND YEAR
PAPER IV – RADIATION SAFETY**

Q.P. Code: 284034

Time : 3 hours

Maximum : 100 marks

I. Elaborate on:

(2X20=40)

1. Explain the various sources of radiation.
2. How will you plan a diagnostic x-ray facility.

II. Write notes on :

(10X6=60)

1. Committed dose and collective dose.
2. Brachytherapy facility design.
3. Guidelines for using TLD badge.
4. GM type survey meter.
5. Atomic energy act -1962.
6. Labeling of the packages.
7. Radiation emergencies in radiotherapy.
8. Genetically significant dose.
9. Linear non threshold risk model.
10. Half value layer.

[LF 1014]

OCTOBER 2014

Sub. Code:4034

**M.Sc., MEDICAL PHYSICS - DEGREE EXAMINATION
SECOND YEAR
PAPER IV – RADIATION SAFETY**

Q.P. Code: 284034

Time : Three hours

Maximum : 100 marks

I. Elaborate on:

(2 x 20 = 40)

1. Discuss in detail, the general considerations in planning of 1000mA x-ray unit with a model lay out.
2. What are the basic concepts of radiation protection standards? Explain in detail, ICRP 2007 recommendations in implementing radiation protection.

II. Write notes on :

(10 x 6 = 60)

1. Factors governing internal exposures
2. Decontamination procedures
3. Radiation survey in teletherapy department
4. Responsibilities of Employers and licensees
5. Radiation Accidents and emergencies in industrial radiography
6. Safety aspects of using radiation in agricultural research
7. General methods of disposal of radioactive wastes
8. Regulations applicable to different mode of transport
9. Special safety features in nuclear reactors
10. TLD Personnel monitoring

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

SECOND YEAR

PAPER IV – RADIATION SAFETY

Q.P. Code : 284034

Time: Three Hours

Maximum: 100 marks

Answer ALL questions

I. Elaborate on:

(2 x 20 = 40)

1. Discuss the type of radiation emergencies that are likely to be encountered in a radiotherapy department consisting of telecobalt, medical linear accelerator and remote afterloading brachytherapy units.
2. What are the principles of radiation safety and protection? Explain the same with suitable examples.

II. Write Notes on:

(10 x 6 = 60)

1. Radiation and tissue weighting factors and their role in the calculation of equivalent and effective dose.
2. General methods of radioactive disposal.
3. Responsibilities of a radiation safety officer (RSO).
4. Area monitoring in radiotherapy treatment rooms.
5. Safety requirements for the design of a brachytherapy facility.
6. Occupational, public and medical exposures.
7. Loss of radiation sources and how they can be tracked.
8. General requirements for all types of packages for the transport of radioactive material.
9. Management of emergencies during transport of radioactive material.
10. Decontamination procedure in nuclear medicine.

[LJ 1016]

OCTOBER 2016

Sub. Code: 4034

**M.Sc. MEDICAL PHYSICS EXAMS
SECOND YEAR
PAPER IV – RADIATION SAFETY**

Q.P. Code: 284034

Time : Three hours

Maximum : 100 Marks

I. Elaborate on: **(2 x 20 = 40)**

1. a) How will you evaluate external radiation hazards?
b) Explain the principle of radiation protection.
2. Discuss in detail, the design of Brachytherapy room (HDR) in Radiation ward.

II. Write notes on: **(10 x 6 = 60)**

1. International Commission on Radiological Protection (ICRP).
2. Factors governing internal exposure.
3. ALI and DAC.
4. Emergency procedures to be followed in case of source stuck in telecobalt machine during treatment.
5. Emergency preparedness during source loading in telecobalt machine.
6. Radiation and tissue weighting factors.
7. Personnel monitoring dosimeters.
8. Regulatory requirements in transporting radioactive sources.
9. General methods of disposal solid radioactive waste nuclear medicine.
10. Legislation governing physical protection of radioactive sources.

[LK 0517]

MAY 2017

Sub. Code: 4034

**M.Sc. MEDICAL PHYSICS EXAMS
SECOND YEAR
PAPER IV – RADIATION SAFETY**

Q.P. Code: 284034

Time : Three hours

Maximum : 100 Marks

I. Elaborate on: **(2 x 20 = 40)**

1. Safe work practice in radiotherapy especially teletherapy and brachytherapy unit.
2. Write about barrier shielding design and safety specifications in radiotherapy unit with suitable diagram.

II. Write notes on: **(10 x 6 = 60)**

1. Source of radiation.
2. Deterministic effects.
3. TLD Badge.
4. Responsibilities of RSO in diagnostic radiology.
5. Effective dose limits.
6. Safety specification for diagnostic X-ray units.
7. Methods of radiation control.
8. ALARA.
9. Pocket dosimeter.
10. Area monitoring or radiation survey methods.

[LL 1017]

OCTOBER 2017

Sub. Code: 4034

**M.Sc. MEDICAL PHYSICS EXAMS
SECOND YEAR
PAPER IV – RADIATION SAFETY**

Q.P. Code: 284034

Time : Three hours

Maximum : 100 Marks

I. Elaborate on: **(2 x 20 = 40)**

1. With the help of neat sketch, explain about the planning consideration of 1000 mA X-ray unit room.
2. Describe in detail about safe work practice in Radiotherapy.

II. Write notes on: **(10 x 6 = 60)**

1. System of Radiation protection.
2. Equivalent dose and effective dose.
3. ICRP radiation dose limit for occupational workers and general public.
4. Pocket Dosimeter.
5. ALI.
6. Classification of nuclear medicine labs.
7. Planning of Tele-cobalt room.
8. Permissible limits for disposal of radioactive waste.
9. Categories of transport packages and Transport index.
10. Explain the radiation accident with an example.

[LM 0518]

MAY 2018

Sub. Code: 4034

**M.Sc. MEDICAL PHYSICS EXAMS
SECOND YEAR
PAPER IV – RADIATION SAFETY**

Q.P. Code: 284034

Time : Three hours

Maximum : 100 Marks

I. Elaborate on: **(2 x 20 = 40)**

1. With the help of the neat sketch, explain about the shielding design of dual energy linear accelerator bunker.
2. Write an essay about transport of radioactive materials.

II. Write notes on: **(10 x 6 = 60)**

1. Categories of radiation exposure.
2. Decontamination procedures.
3. Principles of radiation protection.
4. Area monitoring.
5. TLD badge.
6. Radiation protection in diagnostic radiology.
7. Treatment techniques of solid, liquid and gaseous radioactive wastes.
8. e-LORA.
9. Radiation Protection Rules 2004.
10. Management of radiation emergencies in nuclear medicine.

[LP 1019]

OCTOBER 2019

Sub. Code: 4034

**M.Sc. MEDICAL PHYSICS EXAMS
SECOND YEAR
PAPER IV – RADIATION SAFETY**

Q.P. Code: 284034

Time : Three hours

Maximum : 100 Marks

I. Elaborate on: (2 x 20 = 40)

1. Explain in detail about the shielding design of telecobalt teletherapy bunker with a neat diagram.
2. Write in detail about the transport of radioactive materials.

II. Write notes on: (10 x 6 = 60)

1. ALI and DAC.
2. Area monitoring.
3. TLD badge.
4. Responsibilities of RSO in diagnostic radiology.
5. Effective dose limits of radiation workers and general public as per AERB.
6. Emergencies during loading and unloading of telecobalt source.
7. ALARA.
8. Management of radiation injuries.
9. Deterministic effects.
10. Pocket dosimeters.

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

[AHS 0321]

MARCH 2021

Sub. Code: 4034

(OCTOBER 2020 EXAM SESSION)

M.Sc. MEDICAL PHYSICS

SECOND YEAR (From 2010-2011 onwards)

PAPER IV – RADIATION SAFETY

Q.P. Code : 284034

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate notes on:

(2 x 20 = 40)

1. Explain about the planning of Dual energy Linear Accelerator Installation with neat sketch.
2. Discuss in detail about the Transportation of radioactive substances.

II. Write Short Notes on:

(10x6 = 60)

1. Explain the methods of radiation exposure control.
2. Define Equivalent Dose and Effective Dose. Mention the Equivalent and Effective Dose Limits for Public and Occupational Worker as per AERB.
3. Protective measures to reduce radiation exposure to staff and patients in Diagnostic Radiology.
4. Discuss the General methods of disposal of radioactive waste.
5. Explain the principle of TLD Badge.
6. Management of Radiation Emergencies in the use of radioactive sources in Nuclear Medicine Department.
7. Radiation safety during source transfer operations in Telegamma Equipment.
8. Deterministic and Stochastic effects of Radiation.
9. AERB Radiation Protection Rules 2004.
10. Biological effects of Radiation during pregnancy.

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

[AHS 0122]

**JANUARY 2022
(OCTOBER 2021 EXAM SESSION)**

Sub. Code: 4034

**M.Sc. MEDICAL PHYSICS
SECOND YEAR (From 2010-2011 onwards)
PAPER IV – RADIATION SAFETY
Q.P. Code : 284034**

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate notes on: (2 x 20 = 40)

1. Explain about the planning of Telecobalt Installation with neat sketch.
2. Discuss in detail about the evaluation of Radiation Hazards in Brachytherapy facility.

II. Write Short Notes on: (10x6 = 60)

1. Explain the sources of radiation exposure in Diagnostic Radiology.
2. Define Equivalent Dose and Effective Dose. Mention the Equivalent and Effective Dose Limits for Public and Occupational Worker as per Annals of ICRP 103.
3. Discuss the role of Radiological Safety Officer.
4. Discuss the Treatment techniques for solid, liquid and gaseous radioactive Waste.
5. Area Monitoring.
6. Labeling and Marking of packages for transportation of Radioactive sources.
7. Principles of Radiation Protection
8. Genetic Effects of Radiation.
9. ALARA Principle.
10. Radiation accidents and Emergencies during Loading and unloading of sources.

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

[AHS 1022]

OCTOBER 2022

Sub. Code: 4034

**M.Sc. MEDICAL PHYSICS
SECOND YEAR (From 2010-11 & 2020-2021 onwards)
PAPER IV – RADIATION SAFETY**

Q.P. Code : 284034

Time: Three hours

Answer ALL Questions

Maximum : 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. What are the categories of exposure and describe them in detail?
2. Describe the AERB regulatory requirements to setup new radiation facility.

II. Write notes on:

(10 x 6 = 60)

1. Explain the external hazard and its control measures.
2. Distinguish between primary barrier and secondary barrier.
3. Write about personal protective devices used in radiology department.
4. Write about transport documents.
5. Write about classification of radioactive waste.
6. Write about role and responsibilities of RSO in medical institution.
7. Explain the safety and security of radioactive source in storage as per AERB requirements.
8. At 11.00 a.m. on Friday, the Tc-99m radioisotope activity was measured as 100mCi. What was the activity at 5.00 a.m. and 5.00 p.m. on the same day?
9. Write about labeling and marking of radioactive source transport packages.
10. How will you prevent or reduce chance of occurrence of radiation accidents in radiotherapy department?

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

[AHS 1023]

OCTOBER 2023

Sub. Code: 4034

**M.Sc. MEDICAL PHYSICS
SECOND YEAR (From 2020-2021 onwards)
PAPER IV – RADIATION SAFETY**

Q.P. Code: 284034

Time: Three hours

Answer ALL Questions

Maximum : 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. Shielding design of telecobalt teletherapy bunker with a model layout. Calculate the (a) barrier thicknesses of primary wall, (b) barrier thicknesses of secondary wall, (c) barrier thicknesses of Maze wall and (d) barrier width.
2. System and Principles of Radiological Protection based on the recommendations of the International Commission.

II. Write notes on:

(10 x 6 = 60)

1. A Co-60 source of 10 Ci and Ir-192 source of 12 Ci are placed together in an unshielded container. What would be the exposure rate at 2 m?
2. Evaluation of external radiation hazards.
3. Area monitoring and Personnel monitoring.
4. Safe work practice in Radiotherapy.
5. General requirements for Type B package for the transport of radioactive material.
6. Radiation survey in brachytherapy unit.
7. Monitoring and control of surface contamination.
8. Natural and man-made sources of radiation exposure.
9. Responsibilities of Radiation Safety Officer (RSO) and Employer.
10. Various types of Packages used in transporting radioactive material.

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

[AHS 1025]

OCTOBER 2025

Sub. Code: 4034

**M.Sc. MEDICAL PHYSICS
SECOND YEAR (From 2020-2021 onwards)
PAPER IV – RADIATION SAFETY**

Q.P. Code: 284034

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. a) System of Radiological protection – Justification, Optimization and Dose limits.
b) Safety requirements for the design of a brachytherapy facility.
2. Describe the AERB regulatory requirements to setup a new radiation facility.

II. Write notes on:

(10 x 6 = 60)

1. Radiation survey and leakage measurements in a telecobalt unit.
2. Regulatory requirements in transporting radioactive sources.
3. Radiation and tissue weighting factors and their role in the calculation of equivalent and effective dose.
4. Different personnel protective equipment.
5. Use of ionizing radiation in industrial and agricultural research.
6. Evaluate the thickness and width of the primary barrier for 6 MV medical Linear Accelerator. The distance between isocentre and inner surface of the primary barrier is 5 m. Other side of this barrier is reception. (2 Gy dose delivered per patient, 70 patients treated per day and 5 treatment days in a week).
7. Protective measures to be taken in the spillage of radioactive material.
8. Hazard evaluation in diagnostic radiology.
9. Legislation governing physical protection of radioactive sources.
10. Describe Skyshine and Side scatter photon radiation.
