

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION**SECOND YEAR****PAPER II – CLINICAL RADIATION BIOLOGY****Q.P. Code: 284032****Time : Three Hours****Maximum : 100 marks****Answer ALL questions in the same order.****I. Elaborate on:****Pages Time Marks
(Max.) (Max.) (Max.)**

- | | | | |
|---|----|---------|----|
| 1. Define Linear Quadratic Model. Write an essay on Models in Radiobiology. | 17 | 40 min. | 20 |
| 2. Radiobiological basis of Concurrent Chemotherapy and Radiotherapy. | 17 | 40 min. | 20 |

II. Write notes on:

- | | | | |
|---|---|---------|---|
| 1. High LET Radiation. | 4 | 10 min. | 6 |
| 2. NTCP. | 4 | 10 min. | 6 |
| 3. Diagnosis and Management of oesophageal cancers. | 4 | 10 min. | 6 |
| 4. Percentage labeled mitosis technique. | 4 | 10 min. | 6 |
| 5. Hyperthermia. | 4 | 10 min. | 6 |
| 6. Cell metabolism. | 4 | 10 min. | 6 |
| 7. Point Mutations. | 4 | 10 min. | 6 |
| 8. Cell survival curves. | 4 | 10 min. | 6 |
| 9. Target theory. | 4 | 10 min. | 6 |
| 10. Tissue tolerance dose. | 4 | 10 min. | 6 |

[LC 0413]

APRIL 2013

Sub. Code: 4032

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION

SECOND YEAR

PAPER II – CLINICAL RADIATION BIOLOGY

Q.P. Code: 284032

Time : Three Hours

Maximum : 100 marks

Answer ALL questions

I. Elaborate on:

(2 x 20 = 40)

1. Discuss in detail Acute Radiation Syndrome.
2. Discuss Stochastic and Deterministic effects of radiation.

II. Write notes on:

(10 x 6 = 60)

1. Bergonie-Tribondeau Law.
2. LD 50 dose.
3. Radiation sensitizers.
4. Diagnosis and Management of oropharyngeal cancers.
5. Ribosomes.
6. High LET radiation.
7. Radiobiological basis of Fractionation in Radiotherapy.
8. Benign and Malignant tumours.
9. Standquist isoeffect curves.
10. Tumour doubling time.

[LD 1013]

OCTOBER 2013

Sub. Code: 4032

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION

SECOND YEAR

PAPER II – CLINICAL RADIATION BIOLOGY

Q.P. Code: 284032

Time : Three Hours

Maximum : 100 marks

Answer ALL questions

I. Elaborate on:

(2 x 20 = 40)

1. Discuss the radiobiological principles which form the basis of Fractionated Radiotherapy.
2. Discuss the interaction of ionizing radiation with human cells.

II. Write notes on:

(10 x 6 = 60)

1. Radiosensitisers.
2. Amifostine.
3. Cell-Cycle.
4. Radiation techniques in carcinoma breast.
5. Redistribution.
6. Tumor growth.
7. Concepts of Nominal standard dose.
8. Applications of various models in clinical Radiotherapy.
9. Somatic effects of radiation therapy.
10. High LET radiation.

[LE 0414]

APRIL 2014

Sub. Code: 4032

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION

SECOND YEAR

PAPER II – CLINICAL RADIATION BIOLOGY

Q.P. Code: 284032

Time : Three Hours

Maximum : 100 marks

Answer ALL questions

I. Elaborate on:

(2 x 20 = 40)

1. Define Linear Quadratic Model. Write an essay on Models in Radiobiology.
2. Somatic effects of radiation. What are all the effects of chronic exposure to radiation.

II. Write notes on:

(10 x 6 = 60)

1. Time dose fractionation.
2. NTCP.
3. Diagnosis and Management of oesophageal cancers.
4. Percentage labeled mitosis technique.
5. Hyperthermia.
6. Cell metabolism.
7. Point Mutations.
8. Cell survival curves.
9. Target theory.
10. Tissue tolerance dose.

[LF 1014]

OCTOBER 2014

Sub. Code: 4032

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION

SECOND YEAR

PAPER II – CLINICAL RADIATION BIOLOGY

Q.P. Code: 284032

Time : Three Hours

Maximum : 100 marks

Answer ALL questions

I. Elaborate on:

(2 x 20 = 40)

1. Elaborate on Biological effects of Radiation with cells.
2. Elaborate on Time Dose Fractionation.

II. Write notes on:

(10 x 6 = 60)

1. Draw a structure of the cell.
2. Write about the mitotic and meiotic cell division.
3. Write about the chromosome aberrations.
4. Discuss about the law of Bergonie and Tribondeau.
5. Write notes on genetic effects of radiation.
6. Write notes on benign and malignant disease.
7. Write notes on chemotherapy and radionuclide therapy.
8. Write notes on Research and Professional writing.
9. Write notes on diagnosis and treatment of breast and lung.
10. Write notes on 5RS in Radiobiology and their effect in the cell cycle.

[LH 0415]

OCTOBER 2015

Sub. Code: 4032

M.Sc. (MEDICAL PHYSICS) DEGREE EXAMINATION

(Revised Regulations for Candidates admitted from 2010-2011 Batch onwards)

SECOND YEAR

PAPER II – CLINICAL RADIATION BIOLOGY

Q.P. Code : 284032

Time: Three Hours

Maximum: 100 marks

Answer ALL questions

I. Elaborate on:

(2 x 20 = 40)

1. Discuss the interaction of ionizing radiation with human cells.
2. Elaborate on Time Dose Fractionation.

II. Write Notes on:

(10 x 6 = 60)

1. Radiobiological basis of Fractionation in Radiotherapy.
2. Benign and Malignant tumours.
3. Standquist isoeffect curves.
4. Tumour doubling time.
5. Point Mutations.
6. Cell survival curves.
7. Target theory.
8. Tissue tolerance dose.
9. Concepts of Nominal standard dose.
10. Diagnosis and Management of Cervical cancers.

[LJ 1016]

OCTOBER 2016

Sub. Code: 4032

**M.Sc. MEDICAL PHYSICS EXAMS
SECOND YEAR
PAPER II – CLINICAL RADIATION BIOLOGY**

Q.P. Code: 284032

Time : Three hours

Maximum : 100 Marks

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

1. Define Linear Quadratic model. Write an essay on models in Radiobiology.
2. Radiobiological basis of concurrent Chemotherapy and Radiotherapy.

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

1. Bergonie-Tribondeau Law.
2. Benign and Malignant tumours.
3. Radiation sensitizers.
4. Diagnosis and management of oropharyngeal cancers.
5. Tumour doubling time.
6. High LET radiation.
7. Radiobiological basis of fractionation in radiotherapy.
8. LD 50 dose.
9. Standquist isoeffect curves.
10. Ribosomes.

[LK 0517]

MAY 2017

Sub. Code: 4032

**M.Sc. MEDICAL PHYSICS EXAMS
SECOND YEAR
PAPER II – CLINICAL RADIATION BIOLOGY**

Q.P. Code: 284032

Time : Three hours

Maximum : 100 Marks

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

1. Discuss with a neat diagram the direct and indirect methods of Ionizing radiation interaction with cell. Explain the formation of free radicals and its action on human cells.
2. Explain in detail the Time Dose Fractionation model. Explain how this is used to apply correction for gap in Radiation Treatment fractionation.

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

1. Single and double strand breaks.
2. Point mutations.
3. Discuss cell survival curve.
4. Discuss α/β with reference to early and late reactions.
5. Cumulative Radiation Effect (CRE).
6. Discuss site specific symptoms for head and neck cancers.
7. Chromosome aberrations.
8. Explain the relationship between LET and RBE.
9. Re-oxygenation.
10. Target theory.

[LL 1017]

OCTOBER 2017

Sub. Code: 4032

**M.Sc. MEDICAL PHYSICS EXAMS
SECOND YEAR
PAPER II – CLINICAL RADIATION BIOLOGY**

Q.P. Code: 284032

Time : Three hours

Maximum : 100 Marks

I. Elaborate on:

(2 x 20 = 40)

1. Types of DNA damage and path ways for repair.
2. Hyperthermia.

II. Write notes on:

(10 x 6 = 60)

1. Structure of cell.
2. Phases of cell cycle.
3. Proton therapy.
4. Apoptosis.
5. Phases of intrauterine development.
6. Radio protective agents.
7. Management of carcinoma breast.
8. TDF.
9. Side effects of Radiation therapy.
10. TNM of Oropharyngeal cancers.

[LM 0518]

MAY 2018

Sub. Code: 4032

**M.Sc. MEDICAL PHYSICS EXAMS
SECOND YEAR
PAPER II – CLINICAL RADIATION BIOLOGY**

Q.P. Code: 284032

Time : Three hours

Maximum : 100 Marks

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

1. Staging and management of cancer cervix.
2. Radiation carcinogenesis.

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

1. Ribosomes.
2. Function of mitochondria.
3. 5 R's of radiotherapy.
4. Shoulder effect.
5. Acute radiation sickness.
6. Target theory.
7. Chemical radio protectors.
8. Methods of heating (hyperthermia).
9. Benign and Malignant Tumors.
10. PLD SLD.

[LN 1018]

OCTOBER 2018

Sub. Code: 4032

**M.Sc. MEDICAL PHYSICS EXAMS
SECOND YEAR
PAPER II – CLINICAL RADIATION BIOLOGY**

Q.P. Code: 284032

Time : Three hours

Maximum : 100 Marks

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

1. Stochastic and Deterministic effects of Radiation.
2. Staging and Management of Carcinoma Breast.

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

1. Point Mutation.
2. Tissue tolerance dose.
3. Cell cycle.
4. High LET.
5. Developments of Intrauterine Applicators.
6. Shoulder Effect.
7. Bergonie-Tribondeau Law.
8. Reoxygenation.
9. LDR, MDR, HDR and PDR.
10. Structure of a Cell.

[LP 1019]

OCTOBER 2019

Sub. Code: 4032

**M.Sc. MEDICAL PHYSICS EXAMS
SECOND YEAR
PAPER II – CLINICAL RADIATION BIOLOGY**

Q.P. Code: 284032

Time : Three hours

Maximum : 100 Marks

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

1. Time, Dose and Fractionation (TDF) in radiotherapy.
2. Staging and management of Cancer Lung.

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

1. Direct and indirect action of ionizing radiation.
2. Cell survival curve.
3. Radioprotectors.
4. Linear Energy Transfer (LET) and Relative Biologic Effectiveness (RBE).
5. Hyperthermia.
6. Cell cycle.
7. Bergonie – Tribondeau law.
8. Ribosomes.
9. Acute Radiation Syndrome.
10. Radiation Carcinogenesis.

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

[AHS 0321]

MARCH 2021

Sub. Code: 4032

(OCTOBER 2020 EXAM SESSION)

M.Sc. MEDICAL PHYSICS

SECOND YEAR (From 2010-2011 onwards)

PAPER II – CLINICAL RADIATION BIOLOGY

Q.P. Code : 284032

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate notes on:

(2 x 20 = 40)

1. Radiobiological basis of concurrent Chemotherapy and Radiotherapy.
2. Define Linear Quadratic Model. Write an essay on Models in Radiobiology.

II. Write Short Notes on:

(10x6 = 60)

1. Management of Breast Cancer.
2. Shoulder effect.
3. Method of heating (Hyperthermia).
4. Time Dose Fractionation (TDF).
5. TNM of Oropharyngeal cancers.
6. Re-oxygenation.
7. Cumulative Radiation Effect (CRE).
8. Single and double strand breaks.
9. Radiation Sensitizers.
10. Tumour doubling time.

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

[AHS 0122]

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

Sub. Code: 4032

**M.Sc. MEDICAL PHYSICS
SECOND YEAR (From 2010-2011 onwards)
PAPER II – CLINICAL RADIATION BIOLOGY
Q.P. Code : 284032**

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate notes on:

(2 x 20 = 40)

1. Hyperthermia.
2. Time Dose Fractionation.

II. Write Short Notes on:

(10x6 = 60)

1. 5 R's of radiotherapy.
2. Chemical radio protectors.
3. Discuss α/β with reference to early and late reaction.
4. Chromosome aberrations.
5. Structure of cell.
6. Proton therapy.
7. LD 50 dose.
8. Benign and Malignant tumours.
9. Target theory.
10. Tissue tolerance dose.

THE TAMIL NADU M.G.R. MEDICAL UNIVERSITY

[AHS 1022]

OCTOBER 2022

Sub. Code: 4032

**M.Sc. MEDICAL PHYSICS
SECOND YEAR (From 2010 – 2011 & 2020-2021 onwards)
PAPER II – CLINICAL RADIATION BIOLOGY
Q.P.Code : 284032**

Time: Three hours

Answer ALL Questions

Maximum: 100 Marks

I. Elaborate on:

(2 x 10 = 20)

1. Types of DNA damage and pathways for repair.
2. Discuss in detail about the 5R's in radiobiology.

II. Write notes on:

(10 x 6 = 60)

1. Law of Bergonie and Tribondeau.
2. Mitotic Cell division.
3. PLD and SLD.
4. Mutation.
5. Radio protector agents.
6. Management of Breast cancer.
7. Hyperthermia.
8. Hyperfractionation.
9. TCP and NTCP.
10. Linear Quadratic model.

THE TAMIL NADU M.G.R. MEDICAL UNIVERSITY

[AHS 1023]

OCTOBER 2023

Sub. Code: 4032

**M.Sc. MEDICAL PHYSICS
SECOND YEAR (From 2020-2021 onwards)
PAPER II – CLINICAL RADIATION BIOLOGY**

Q.P. Code: 284032

Time: Three hours

Maximum: 100 Marks

Answer ALL Questions

I. Elaborate on:

(2 x 20 = 40)

1. Professional aspects and role of Medical Physicists.
2. Biological effects of radiation and its dependence on dose, dose rate, type and energy of radiation.

II. Write notes on:

(10 x 6 = 60)

1. Chromosome segregation.
2. Organic constituents of cells.
3. Radiolytic products of water.
4. Hyperthermic sensitization.
5. Acute radiation sickness.
6. Somatic effects of radiation.
7. Method of spread of malignant disease.
8. Hormone therapy.
9. Principles of professional practice.
10. High LET radiation therapy.

THE TAMIL NADU M.G.R. MEDICAL UNIVERSITY

[AHS 1024]

OCTOBER 2024

Sub. Code: 4032

**M.Sc. MEDICAL PHYSICS
SECOND YEAR (From 2020-2021 onwards)
PAPER II – CLINICAL RADIATION BIOLOGY**

Q.P. Code: 284032

Time: Three hours

Maximum: 100 Marks

Answer ALL Questions

I. Elaborate on:

(2 x 20 = 40)

1. Write about somatic effects of radiation and the factors influencing it.
2. Discuss the radiobiological principle that forms the basis of fractionated Radiation therapy.

II. Write notes on:

(10 x 6 = 60)

1. Radio protectors.
2. Prodromal radiation syndrome.
3. Role of medical physicists in cancer patient management.
4. Continuous Hypofractionated Accelerated Radiation Therapy (CHART).
5. Radiation carcinogenesis.
6. Nominal Standard Dose (NSD).
7. Constituents of a cell.
8. Chromosomal aberrations.
9. Bystander effect.
10. List out any five methods of cancer prevention.

THE TAMIL NADU M.G.R. MEDICAL UNIVERSITY

[AHS 1025]

OCTOBER 2025

Sub. Code: 4032

**M.Sc. MEDICAL PHYSICS
SECOND YEAR (From 2020-2021 onwards)
PAPER II – CLINICAL RADIATION BIOLOGY**

Q.P. Code: 284032

Time: Three hours

Maximum: 100 Marks

Answer ALL Questions

I. Elaborate on:

(2 x 20 = 40)

1. Hyper-fractionation, Hypo-fractionation and time interval between multiple daily fractions. Elucidate the lessons learnt from these studies.
2. Direct and indirect methods of ionizing radiation interaction with living cells. Explain the formation and action of free radicals in relation to the above.

II. Write notes on:

(10 x 6 = 60)

1. Structure of the cell.
2. Ribosomes.
3. Genetic variation crossing over.
4. Cellular effects of radiation.
5. Potentially lethal damage.
6. LD 50.
7. Immunotherapy.
8. Management of Head and Neck cancers.
9. Repair-misrepair hypothesis.
10. Time dose fractionation.
