[LL 0817] AUGUST 2017 **Sub. Code: 1936**

B.Sc. RADIOTHERAPY TECHNOLOGY
(New Syllabus 2014-2015)
THIRD YEAR
PAPER I – RECENT ADVANCES IN RADIOTHERAPY TECHNIQUES

Q.P. Code: 801936

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

Answer all questions

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

1. Give a brief introduction on Particle therapy and explain about Proton therapy.
2. Discuss briefly about Beam Modifying devices and discuss in detail about different types of wedges and its uses.
3. Discuss in detail about the patient position verification for a VMAT treatment.

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

1. What are cerrobend material and its composition and advantage?
2. Advantage and Disadvantage of custom block and MLC?
3. Write a short note on Simulator and Virtual Simulator.
4. Discuss with diagram about the treatment technique for Medulloblastoma.
5. The accessories used for localization and positional verification in SRS & SRT.
6. Preparation of tongue immobilization and its uses.
7. Treatment techniques for Ca Breast.
8. Discuss about the advantages and disadvantages of LINAC & Cobalt-60 machine.

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

1. Gamma Knife.
2. MLC.
3. Block thickness required for 4MV, 6MV, 10MV, 15 MV and electrons.
4. Cyber knife.
5. Difference between CBCT and fan beam CT.
6. What is inverse and forward planning?
7. Why applicators are used during electron beam therapy?
8. IGRT.
9. Gated RT.
10. Types of loading Brachytherapy source.

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[LM 0218] FEBRUARY 2018 **Sub. Code: 1936**

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

THIRD YEAR

PAPER I – RECENT ADVANCES IN RADIOTHERAPY TECHNIQUES

Q.P. Code: 801936

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

Answer all questions

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

1. Volumetric Modulated Arc Therapy and its advantages over IMRT.
2. The role of a technologist during IMRT treatment for Ca. Nasopharynx – Explain in detail including patient preparation, patient set up, chart checking and verification.
3. Explain SRS and SRT and explain the various accessories used for immobilization and localization during SRS/SRT treatments.

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

1. The role of electron beams in Radiotherapy.
2. Different types of Bolus materials. Explain why bolus is used during radiotherapy.
3. Real time imaging. Advantages of using real time imaging in radiotherapy.
4. Treatment technique for total body electron therapy.
5. Networking in radiotherapy and advantage.
6. Different types of simulator.
7. Patient setup and image verification in advanced treatment techniques.
8. Types of Brachytherapy with examples.

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

1. Usage of Fiducial implants in radiotherapy.
2. Wright notes on cerrobend material.
3. Possible treatment techniques for Ca. Rectum.
4. Short notes on immunotherapy.
5. Procedure for Planning CT.
6. Uses of wedges in radiotherapy.
7. The difference between Co-Planar and Non Co-Planar treatment techniques.
8. MLC and its advantages.
9. Advantage of custom blocks with example.
10. What is Hypo fractionated Radiotherapy and Hyper fractionated Radiotherapy?

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[LN 0818] AUGUST 2018 **Sub. Code: 1936**

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

THIRD YEAR

PAPER I – RECENT ADVANCES IN RADIOTHERAPY TECHNIQUES

Q.P. Code: 801936

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

Answer all questions

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

1. PET CT in Radiotherapy Planning.
2. Advantages and Challenges of Image Guided Radiation Therapy.
3. Radioactive Isotopes used in Therapy.

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

1. Workflow for 3D Conformal Radiation Therapy.
2. Gamma Knife based Radiosurgery.
3. Dynamic Arc.
4. Immobilization.
5. Errors in Radiotherapy.
6. Stereotactic Ablative Body Radiotherapy (SABR).
7. CT-MR Fusion in Radiotherapy Planning.
8. BRW frame and its use.

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

1. Angiographic localizer box.
2. Radio sensitizers and common clinical use.
3. Mention briefly the indications for radiation in Benign diseases.
4. Indications for Proton Beam radiotherapy.
5. OARs in Pelvic Radiation therapy and their respective Dose constraints.
6. Types of Movements in 4D planning and treatment.
7. Imaging Techniques for IGRT.
8. Cancer Epidemiology in India.
9. Electron treatment techniques.
10. Interstitial Brachytherapy.

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[LO 0219] FEBRUARY 2019 **Sub. Code: 1936**

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

THIRD YEAR

PAPER I – RECENT ADVANCES IN RADIOTHERAPY TECHNIQUES

Q.P. Code: 801936

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

Answer all questions

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

1. Stereotactic Radiosurgery.
2. Image Guided Brachytherapy.
3. Role of radiotherapy technician in the planning process and treatment of Total Body Irradiation.

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

1. High LET Radiation.
2. Radiotherapy Treatment Workflow (TRWF).
3. Electronic Brachytherapy.
4. Linac Based Radiosurgery.
5. Techniques for minimizing organ motion during 4D treatment.
6. Adaptive Radiotherapy.
7. Concurrent Chemo radiation.
8. Total Skin Electron Therapy (TSET).

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

1. Differences between Image Guided Radiotherapy and Stereotactic Body Radiotherapy.
2. Hyperthermia and its use in Radiotherapy.
3. Body Positions in Total Body Irradiation.
4. Cancer Pain Management.
5. Immunotherapy.
6. Particle Radiotherapy.
7. Customized Block Making.
8. Hemi-body irradiation.
9. Winston Lutz Test.
10. Fiducial Markers in Radiation Therapy and its uses.

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[LP 0819] AUGUST 2019 **Sub. Code: 1936**

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

THIRD YEAR

PAPER I – RECENT ADVANCES IN RADIOTHERAPY TECHNIQUES

Q.P. Code: 801936

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

Answer all questions

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

1. Intensity modulated radiotherapy.
2. Chemoradiation.
3. Image guided brachytherapy in carcinoma cervix.

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

1. Immobilisation devices.
2. Respiratory gating in radiotherapy.
3. Cyberknife.
4. PET-CT in radiotherapy planning.
5. Intraoperative radiotherapy.
6. Linear energy transfer.
7. Mention any five radioisotopes with its properties and uses.
8. Dose volume histogram.

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

1. Half value layer and its importance.
2. Characteristics of ideal brachytherapy source.
3. Spread out brag peak.
4. Oxygen effect.
5. RTOG grading of radiation induced mucositis.
6. What is HDR and radioisotopes used in HDR?
7. Monitor units.
8. Penumbra.
9. On board imaging.
10. Internal target volume.

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[LQ 0220] FEBRUARY 2020 **Sub. Code: 1936**

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

THIRD YEAR

PAPER I – RECENT ADVANCES IN RADIOTHERAPY TECHNIQUES

Q.P. Code: 801936

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

Answer all questions

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

1. Volumetric Modulated Arc Therapy (VMAT).
2. Stereotactic Radiotherapy.
3. Immobilization and Tracking in Image Guided Radiotherapy.

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

1. Total Body radiation.
2. Intra Operative Radiation Therapy (IORT).
3. Radio sensitizers.
4. Various verification strategies in conformal radiotherapy.
5. Adaptive Radiotherapy.
6. 4D CT Simulation.
7. Robotic Radiosurgery.
8. Hyperthermia.

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

1. Virtual Simulation.
2. Dynamic Wedge.
3. Cone Beam CT and its role in Radiotherapy.
4. Image Registration.
5. Electronic portal imaging device.
6. Dose Volume Histograms.
7. PACS system in Radiotherapy Workflow.
8. Targeted Therapy.
9. GTV/CTV/ITV/PTV.
10. RPM Systems in Radiotherapy.

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

[LR 1220] DECEMBER 2020 Sub. Code: 1936
(AUGUST 2020 EXAM SESSION)

BACHELOR IN RADIOTHERAPY TECHNOLOGY
THIRD YEAR – (Regulation from 2014-2015)
PAPER I – RECENT ADVANCES IN RADIOTHERAPY TECHNIQUES
Q.P. Code: 801936

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

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

1. Particle Beam Therapy.
2. Volumetric Modulated Arc Therapy (VMAT).
3. Adaptive Radiotherapy.

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

1. Realtime Tumour Tracking.
2. Bolus and its uses.
3. Information Technology and Networking in Radiotherapy.
4. Gamma knife.
5. Indications of Emergency Radiotherapy and describe any two with illustration.
6. Tomotherapy.
7. Mention Beam Modifying devices and describe any two.
8. Interstitial Brachytherapy in Carcinoma Cervix.

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

1. Merits of Proton Beam Therapy.
2. Compensators.
3. Relative biological effectiveness.
4. Mention organ at risk and dose constraints for radiotherapy planning in parotid cancer.
5. Picture Archiving and Communication Systems (PACS) in radiotherapy.
6. Merits and demerits of IMRT.
7. Uncertainties in Radiotherapy.
8. SSD technique.
9. Involved Field Radiotherapy.
10. Electronic Portal Imaging Device.

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

[AHS 0122] JANUARY 2022 Sub. Code: 1936
(FEBRUARY 2021 & AUGUST 2021 EXAM SESSION)

B.Sc. RADIOTHERAPY TECHNOLOGY
THIRD YEAR – (Regulations from 2014-2015 and 2018-2019)
PAPER I – RECENT ADVANCES IN RADIOTHERAPY TECHNIQUES
Q.P. Code: 801936

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

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

1. Describe in detail about Image Guided Radiotherapy.
2. Write about electron beam therapy.
3. Mention the various types of Brachytherapy and describe in detail about HDR intracavitory therapy.

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

1. 6 degrees of freedom couch advantages.
2. Stereotactic Radiotherapy.
3. Gammaknife.
4. Charecteristics of ideal brachytherapy source.
5. Dynamic Multileaf collimators.
6. Acclererated partial breast irradiation.
7. Intraluminal brachytherapy.
8. Electronic portal imaging device.

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

1. Fiducial markers.
2. CT simulation.
3. Hemibody irradiation.
4. Haemostatic Radiotherapy.
5. Nerve blocks for pain relief.
6. Adaptive Radiotherapy.
7. Customized blocks.
8. Pencil beam.
9. Organs at risk and critical structures.
10. What is normalization?

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

[AHS 0922] SEPTEMBER 2022 Sub. Code: 1936
(FEBRUARY 2022 & AUGUST 2022 EXAM SESSIONS)

B.Sc. RADIOTHERAPY TECHNOLOGY
THIRD YEAR – (Regulations from 2014-2015 & 2018-2019)
PAPER I – RECENT ADVANCES IN RADIOTHERAPY TECHNIQUES
Q.P. Code: 801936

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

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

1. Discuss in detail about the differences between IMRT and 3D CRT.
2. Write elaborately on Proton Beam Therapy.
3. Explain about advantages and disadvantages of Cobalt -60 brachytherapy.

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

1. Multileaf collimators.
2. Stereotactic Body radiotherapy.
3. Cyberknife.
4. Electronic brachytherapy.
5. Immobilization devices in EBRT.
6. Uses of hypofractionated Radiotherapy.
7. 4D Simulation technique.
8. Interstitial brachytherapy.

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

1. Arc therapy.
2. PET - CT in radiotherapy planning.
3. Total body Irradiation.
4. Palliative Spine RT.
5. Pain ladder.
6. Electron cones.
7. Intraoperative Radiotherapy.
8. Fiducial markers.
9. Name the treatment volumes in IMRT.
10. Optimization.

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

[AHS 0423] **APRIL 2023** **Sub. Code: 1936**

B.Sc. RADIOTHERAPY TECHNOLOGY
THIRD YEAR – (Regulations 2014-2015 & 2018-2019 onwards)
PAPER I – RECENT ADVANCES IN RADIOTHERAPY TECHNIQUES
Q.P. Code: 801936

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

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

1. Discuss in detail about the various types of Conformal Radiotherapy.
2. Write about concurrent Chemoradiation.
3. Discuss in Detail about the differences between HDR and LDR brachytherapy.

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

1. Flattening Filter Free treatment.
2. Stereotactic Radiosurgery.
3. Tomotherapy.
4. I - 131 Ablation therapy.
5. DIBH Technique.
6. Cone beam CT.
7. Asymmetrical Jaws in Cobalt Unit.
8. Vault brachytherapy.

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

1. Monitor units.
2. Treatment planning system.
3. Total skin Electron Therapy.
4. Emergency RT to mediastinum.
5. Radioimmunotherapy.
6. Immunotherapy.
7. Micro-MLCs.
8. Surface mould therapy.
9. Uses of laser alignment system.
10. Isodose curves.

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

[AHS 1123] **NOVEMBER 2023** **Sub. Code: 1936**

B.Sc. RADIOTHERAPY TECHNOLOGY
THIRD YEAR – (Regulations 2014-2015 & 2018-2019 onwards)
PAPER I – RECENT ADVANCES IN RADIOTHERAPY TECHNIQUES
Q.P. Code: 801936

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

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

1. Describe Image Guided Radiotherapy in detail.
2. Heavy ion therapy and challenges to technologists to the introduction of new technologies.
3. PET in Radiotherapy treatment planning.

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

1. Proton beam therapy.
2. Stereotactic Radiotherapy.
3. Robotic Radiotherapy.
4. Significance of patient simulation in Radiotherapy.
5. Merits and demerits of gated (4D) Radiotherapy.
6. Potentiation of Radiosensitizers.
7. Compare and contrast of low LET Radiation.
8. Limitations to the clinical use of Hyperthermia.

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

1. Helical Tomotherapy.
2. Virtual simulation.
3. Thermal and non-thermal effects of Ultrasound.
4. 3D compensators.
5. Radioimmunotherapy.
6. Genetic pro-drug activation.
7. Patient data management.
8. Basics of palliative care.
9. PACS.
10. Multileaf Collimator (MLC).

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

[AHS 0424] **APRIL 2024** **Sub. Code: 1936**

B.Sc. RADIOTHERAPY TECHNOLOGY
THIRD YEAR – (Regulations 2014-2015 & 2018-2019 onwards)
PAPER I – RECENT ADVANCES IN RADIOTHERAPY TECHNIQUES
Q.P. Code: 801936

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

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

1. What is significance of positioning and immobilization in Radiotherapy? What are process of patient setup and how to improve its efficacy?
2. Describe Principle and Radiobiology of Hyperthermia.
3. Describe rationale and clinical applications of Tomotherapy.

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

1. Define percentage depth dose and its application in Radiotherapy.
2. Inverse planning in Radiotherapy.
3. What are cumulative and differential DVH? What are advantages and limitations of DVH.
4. What are characteristics of Ideal Brachytherapy source? Mention properties and uses of Iridium-192.
5. Monoisocentric technique.
6. Role of PET in Radiotherapy planning.
7. Role and technique of Radiotherapy in carcinoma breast.
8. Interstitial Brachytherapy.

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

1. Merits and Demerits of IMRT.
2. TPS based simulation.
3. ICRU Report No.62 and its significance.
4. Application of CT imaging in oncology practice.
5. Mention immobilization devices used during Radiotherapy to brain tumours.
6. Monitor units.
7. Radioimmuno therapy.
8. Gene therapy.
9. Radioactive Isotopes.
10. Multileaf collimators.

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

[AHS 0125] **JANUARY 2025** **Sub. Code: 1936**

B.Sc. RADIOTHERAPY TECHNOLOGY
THIRD YEAR – (Regulations 2014-2015 & 2018-2019 onwards)
PAPER I – RECENT ADVANCES IN RADIOTHERAPY TECHNIQUES
Q.P. Code: 801936

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

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

1. Principles and basics of Chemoradiation.
2. Enumerate the indications of Craniospinal irradiation. Describe techniques used in Neuraxins irradiation with illustration.
3. Proton Beam Therapy.

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

1. Inverse planning in Radiotherapy.
2. Therapeutic ratio and its impact on local tumor control and survival.
3. What do you understand by simultaneous integrated boost technique and its significance in Radiotherapy treatment planning?
4. Picture Archiving and Communication Systems (PACS) in Radiotherapy.
5. SRS.
6. Virtual simulation.
7. Classify uncertainties in Radiotherapy and describe them.
8. What are Radiosensitizers? Enumerate and mention its advantages.

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

1. Synergism.
2. Drugs in pain management (WHO Criteria).
3. Thermotolerance.
4. Immunotherapy.
5. Megavoltage Cone Beam CT.
6. Respiratory gating.
7. Internal target volume.
8. Oxygen effect.
9. Mention and define different dose rates in Brachytherapy.
10. Relative biological effectiveness.

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

[AHS 0425] **APRIL 2025** **Sub. Code: 1936**

B.Sc. RADIOTHERAPY TECHNOLOGY
THIRD YEAR – (Regulations 2014-2015 & 2018-2019 onwards)
PAPER I – RECENT ADVANCES IN RADIOTHERAPY TECHNIQUES
Q.P. Code: 801936

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

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

1. Discuss in detail about CT simulator and write the Rationale for CT simulation.
2. Write in detail about Proton Beam Therapy.
3. Explain about Robotic Radiotherapy and write its work flow.

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

1. Working principle of Positron Emission Tomography (PET).
2. Explain the Beam profile with flattening filter.
3. Plan evaluation in treatment planning.
4. Cone beam CT.
5. Electronic portal imaging device.
6. Hazards of low dose and low energy Neutron.
7. Role and techniques of RT in Glioblastoma.
8. Explain forward planning and inverse planning in RT.

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

1. Name any three Radiosensitizers.
2. Image registration.
3. Bolus.
4. Binary Multileaf Collimator (MLC).
5. Cancer Epidemiology in India
6. Organ at Risk (OAR) in Pelvic Radiotherapy.
7. Concurrent Chemo Radiation.
8. Penumbra.
9. Write the advantages of static MLC.
10. Dynamic wedge.

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

[AHS 1125] **NOVEMBER 2025** **Sub. Code: 1936**

B.Sc. RADIOTHERAPY TECHNOLOGY
THIRD YEAR – (Regulations 2014-2015 & 2018-2019 onwards)
PAPER I – RECENT ADVANCES IN RADIOTHERAPY TECHNIQUES
Q.P. Code: 801936

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

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

1. Principle and steps involved in 3D Conformal Radiotherapy (3D-CRT).
2. Helical Tomotherapy and its merits and demerits.
3. Explain Stereotactic Radiosurgery (SRS) and Stereotactic Radiotherapy (SRT) in detail.

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

1. Image-Guided Radiotherapy (IGRT).
2. 6 degrees of freedom couch advantages.
3. Radiosensitizers.
4. Hyperthermia and its limitations.
5. Dynamic Multileaf collimators.
6. Gene therapy.
7. Patient management in palliation.
8. Proton therapy.

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

1. Virtual simulation.
2. Heavy ion therapy.
3. Compensators.
4. Hyperthermia.
5. High LET (Linear Energy Transfer) radiations.
6. PACS. (Picture Archiving and Communication System)
7. Intensity-Modulated Radiotherapy (IMRT).
8. Immunotherapy.
9. Cancer vaccines.
10. Networking in Radiotherapy.

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