April-2001

[KD 150] **Sub. Code : 2047**

M.D. DEGREE EXAMINATION.

(Revised Regulations)

Branch IX — Radiotherapy

Part II — Preliminary

MEDICINAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time : Three hours Maximum : 100 marks

Answer ALL questions.

1. Enumerate the various factors that influence the percentage depth dose values of a radiation beam and describe them. What are isodose charts? Describe with the help of a diagram the 4 mV X-ray beam isodose chart. (25)

2. Describe the basic plan of a radiotherapy department that is required to provide radiotherapy facilities to manage about 3000 new cancer patients annually. (25)

3. Write short notes on : (5 × 10 = 50)

(a) The build up and its clinical implications

(b) The optimum energy for teletherapy you prefer at your centre

(c) Charged particles in radiotherapy

(d) After loading interstitial brachytherapy

(e) Remote control after loading low dose-rate techniques.

November-2001

[KE 150] **Sub. Code : 2047**

M.D. DEGREE EXAMINATION.

(Revised Regulations)

Branch IX — Radiotherapy

Part II — Preliminary

MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time : Three hours Maximum : 100 marks

1. Explain how a linear accelerator works and compare it with a telecobalt unit. (25)

2. What are the different interactions of 'X' and 'gamma' radiations with matter? What is their significance in clinical radiotherapy? (25)

3 Write briefly on : (5 × 10 = 50)

(a) Radiation survey in a brachytherapy facility.

(b) High LET particles in Radiotherapy.

(c) Half value thickness.

(d) Central axis percentage depth dose.

(e) Lasers in radiotherapy.

March-2002

[KG 150] **Sub. Code : 2047**

M.D. DEGREE EXAMINATION

(Revised Regulations)

Branch IX — Radiotherapy

Part II — Preliminary

MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time : Three hours Maximum : 100 marks

Answer ALL questions.

1. Describe the salient features of electron beam therapy. (25)

2. Draw a block diagram of a linear accelerator and explain briefly the functions of various components. (25)

3. Write short notes on : (5 × 10 = 50)

   (a) Isodose chart.

   (b) Intensity Modulated Radiotherapy (IMRT)

   (c) ALARA.

   (d) Biological effects of radiation.

   (e) O.E.R.

September-2002

[KH 150] **Sub. Code : 2047**

M.D. DEGREE EXAMINATION.

(Revised Regulations)

Branch IX — Radiotherapy

Part II — Preliminary

MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time : Three hours Maximum : 100 marks

1. Explain the principle and construction of a High Energy Linear Accelerator used for clinical radiotherapy. (25)

2. Compare the physical parameters of cobalt–60 gamma rays, linear accelerator X ray photons lower energy and higher energies, and high energy electron beams. (25)

3 Write briefly on : (5 × 10 = 50)

(a) Endovascular brachytherapy

(b) Stereotactic radio surgery

(c) Simulator CT machines

(d) Late effects of ionising radiations

(e) Aluminium tissue compensators.

April-2003

[KI 150] **Sub. Code : 2047**

M.D. DEGREE EXAMINATION.

(Revised Regulations)

Branch IX — Radiotherapy

Part II — Preliminary

MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time : Three hours Maximum : 100 marks

Answer ALL questions.

1. Define the quantities "EXPOSURE" and "ABSORBED DOSE" relating to X and gamma radiation beams. How you will measure the output of a linear accelerator? (25)

2. Write an essay on the production of artificial radioactive isotopes. What are the physical parameters of various radioactive isotopes used in clinical radiotherapy. (25)

3. Write briefly on : (5 × 10 = 50)

(a) Air Kerma rate at 1 metre

(b) High Dose Rate Remote Afterloading Brachytherapy

(c) TLD Personnel Monitoring Badge

(d) QA for Teletherapy machines

(e) Pi Mesons.

[KJ 150] **Sub. Code : 2047**

M.D. DEGREE EXAMINATION.

(Revised Regulations)

Branch IX — Radiotherapy

Part II — Preliminary

MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time : Three hours. Maximum : 100 marks

Theory : Two hours and forty minutes. Theory : 80 marks

M.C.Q. : Twenty minutes. M.C.Q. : 20 marks

M.C.Q. must be answered **SEPARATELY** on the Answer Sheet provided as per the instructions given on the first page of M.C.Q. Booklet.

Answer ALL questions.

Draw suitable diagrams wherever necessary.

Essay Questions : (2 × 15 = 30)

1. Discuss : Remote after loading and manual after loading.

2. Analyse : Role of different imaging modalities in treatment planning.

3. Short notes questions : (10 × 5 = 50)

(a) Stereotactic Radio–Surgery.

(b) Conformal Radiotherapy.

(c) Electron beam interaction with matter.

(d) Factors affecting Tissue–air ratio.

(e) Half–life and Half–value layer thickness.

(f) Co–60 decay scheme.

(g) Tissue inhomogeneities correction methods.

(h) Box technique.

(i) Radiation protection measures to be taken during brachytherapy.

(j) Moulds.

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KL 150] **Sub. Code : 2047**

M.D. DEGREE EXAMINATION.

(Revised Regulations)

Branch IX — Radiotherapy

Part II — Preliminary

MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time : Three hours — Maximum : 100 marks

Theory : Two hours and forty minutes — Theory : 80 marks

M.C.Q. : Twenty minutes — M.C.Q. : 20 marks

Answer ALL questions.

Draw suitable diagrams wherever necessary.

I. Essay questions : $(2 \times 15 = 30)$

(1) Explain how Bremstralungh radiation is produced.

(2) What is a CT simulator? Explain how planning is performed with a CT Simulator.

II. Short notes : $(10 \times 5 = 50)$

(a) Define percentage depth dose (PDD) and explain the factors that affect the PDD.

(b) What is a virtual wedge (or Dynamic wedge)? Compare it with a physical wedge.

(c) Discuss the methods of applying corrections for tissue in homogeneties.

(d) Write a note on Secondary standard dosimeter.

(e) Explain Therapeutic Range, Practical range and 50% range of an electron beam with a diagram of an electron beam central axis depth dose curve.

(f) Discuss the Paris technique for interstitial implant.

(g) Define point A and point B in Intracavitary application and discuss the ICRU method of dose reporting and prescription for intra uterine application.

(h) Write a short note on the Electronic Portal imaging device (EPID).

(i) Discuss Equivalent dose and Effective dose.

(j) Describe Stochastic Effect and Deterministic effect.

[KM 150] **Sub. Code : 2047**

M.D. DEGREE EXAMINATION.

Branch IX — Radiotherapy

Part II — Preliminary

MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time : Three hours Maximum : 100 marks

Theory : Two hours and forty minutes Theory : 80 marks

M.C.Q. : Twenty minutes M.C.Q. : 20 marks

Answer ALL questions.

Draw suitable diagrams wherever necessary.

I. Essay questions : $(2 \times 15 = 30)$

(1) Discuss the construction and working of medical linear accelerator.

(2) Discuss in detail on treatment planning system with special mention to 3D conformal radiotherapy planning.

II. Short notes questions : $(10 \times 5 = 50)$

(a) Characteristics of isotopes used in brachytherapy

(b) Nuclear fission

(c) Half Value Layer (HVL)

(d) Orthogonal Imaging Method

(e) Absorbed dose and integral dose

(f) TAR/TMR and Percentage Depth Dose (PDD)

(g) Maximum Permissible Limits (MPL)

(h) Personal Monitoring Devices

(i) Beam modifiers

(j) Radiation detectors.

[KO 150] **Sub. Code : 2049**

M.D. DEGREE EXAMINATION.

Branch IX — Radiotherapy

MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time : Three hours Maximum : 100 marks

Theory : Two hours and forty minutes Theory : 80 marks

M.C.Q. : Twenty minutes M.C.Q. : 20 marks

Answer ALL questions.

Draw suitable diagrams wherever necessary.

I. Essay questions : (2 × 15 = 30)

(1) (a) Compare Telecobalt machine with linear accelerator and highlight their merits and demerits in clinical practice.

(b) What are the quality assurance tests for such units in clinical practice?

(2) What is particle therapy? Discuss various particle beams used in Modern clinical practice.

II. Short notes : (10 × 5 = 50)

(a) Radiation sources used in Brachy therapy.

(b) Wedge filters.

(c) Electron beam therapy.

(d) Define Half life, Mean life and Specific Activity.

(e) Photoelectric effect.

(f) TL Dosimetry.

(g) Percentage depth dose.

(h) Electronic portal imaging.

(i) Dose limit for public and radiation workers.

(j) Paterson Parker system.

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[KP 150] **Sub. Code : 2047**

M.D. DEGREE EXAMINATION.

Branch IX — Radiotherapy

Part II — Preliminary

MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY

Time : Three hours Maximum : 100 marks

Theory : Two hours and forty minutes Theory : 80 marks

M.C.Q. : Twenty minutes M.C.Q. : 20 marks

Answer ALL questions.

Draw suitable diagrams wherever necessary.

I. Essay questions :

(1) Explain with the help of suitable cross sectional diagram, the design and working of a teletherapy machine with a Co–60 radioisotope. What are the various disadvantages of Tellecobalt machines as compared to linear accelerators. (20)

(2) Explain in detail the radiobiology of LDR, MDR and HDR brachytherapy with reference to cancer of the uterine cervix. (15)

(3) What is Mega voltage radiation? Discuss the construction of loom and installation of High energy linear accelerator. (15)

II. Short notes : (6 × 5 = 30)

(a) Tissue maximum ratio.

(b) Shielding blocks.

(c) Inverse Square law.

(d) Effective dose equivalent

(e) Annual maximum permissible close limits.

(f) Wedges.

[KQ 180] **Sub. Code : 2049**

M.D. DEGREE EXAMINATION.

Branch IX — Radiotherapy

Paper I — MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

(Candidates admitted from 2004-05 onwards)

Time : Three hours — Maximum : 100 marks

Theory : Two hours and forty minutes — Theory : 80 marks

M.C.Q. : Twenty minutes — M.C.Q. : 20 marks

Answer ALL questions.

Draw suitable diagrams wherever necessary.

I. Essay questions :

(1) Describe the physical properties of alpha, beta, gamma rays and their absorption in matter and the methods of detection. (20)

(2) Draw a block diagram of linear accelerator and describe briefly the functions of the various parts and the clinical applications. (15)

(3) Mention factors that modify radiation response and discuss in detail radio sensitizers and their mechanism of action. (15)

II. Short notes : (6 × 5 = 30)

(a) Manchester system

(b) RBE and fractionation

(c) Radiation survey in a teletheraphy facility

(d) IMRT clinical application

(e) Radiation protection rules in India

(f) Rotation and arc therapy.

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[KR 150] **Sub. Code : 2046**

M.D. DEGREE EXAMINATION.

Branch — IX — Radiotherapy

Paper I — MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

(Candidates admitted from 2004–05 onwards)

Time : Three hours Maximum : 100 marks

Theory : Two hours and forty minutes Theory : 80 marks

M.C.Q. : Twenty minutes M.C.Q. : 20 marks

Answer ALL questions.

Draw suitable diagrams whenever necessary.

I. Essay :

1. Discuss the role of adjuvant radiotherapy in Oncologic practice. Narrate giving two examples. (20)

2. Discuss the radiobiologic basis of radiation. (15)

3. Write an account on altered radiation fractionation. (15)

II. Short notes : (6 × 5 = 30)

(a) Radio-sensitizers

(b) Apoptosis

(c) Clinical trials

(d) Electron beam therapy

(e) Hyperthermia and radiation

(f) Therapeutic ratio.

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MARCH 2008

[KS 140] **Sub. Code : 2035**

M.D. DEGREE EXAMINATION.

Branch IX — Radiotherapy

Paper I — MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

Common to all Regulations

Q.P.Code : 202035

Time : Three hours Maximum : 100 marks

Answer ALL questions.

I. Essay : $(2 \times 20 = 40)$

1. Give an account of Radiation protection as relevant to Radiation oncology practice. (20)

2. Name the various brachytherapy implant dosimetry systems and describe any one in detail. (20)

II. Short notes : $(10 \times 6 = 60)$

1. Multileaf collimators.
2. Tissue compensators.
3. Percentage depth dose.
4. Radioprotectors.
5. ^{99m}Tc.
6. p-value.
7. Hyperthermia.
8. Lymphatic drainage of tongue.
9. Cancer Registry.
10. BED (Biological Effective Dose).

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March 2009

[KU 140] **Sub. Code: 2035**

M.D. DEGREE EXAMINATION

Branch IX – RADIO THERAPY
(Common to all candidates)

Paper I – MEDICAL RADIATION PHYSICS AS APLLIED TO RADIOTHERAPY AND RADIATION BIOLOGY
Q.P. Code : 202035

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

Draw suitable diagram wherever necessary.
Answer ALL questions.

I. Essay questions : **(2 x 20 = 40)**

1. Given an account of Radiation protection as relevant to radiation oncology practice.

2. Discuss on Radiation induced DNA damage and repair.

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

1. Apoptosis.
2. ISO-dose charts.
3. Describe cell cycle.
4. Tr-192.
5. Dose – volume histograms.
6. Compton scatter.
7. ICRU – 58.
8. HDR Brachytherapy.
9. Therapeutic Ratio.
10. Beam modifying devices.

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September 2009

[KV 140] **Sub. Code: 2035**

M.D. DEGREE EXAMINATION

Branch IX – RADIO THERAPY
(Common to all candidates)

Paper I – MEDICAL RADIATION PHYSICS AS APLLIED TO RADIOTHERAPY AND RADIATION BIOLOGY
Q.P. Code : 202035

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

Draw suitable diagram wherever necessary.
Answer ALL questions.

I. Essay questions : **(2 x 20 = 40)**

1. Name the various brachytherapy implant dosimetry systems and describe any one in detail.

2. Discuss interaction of energy with matter. Highlight it's importance in clinical practice.

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

1. The cell cycle and it's relevance.
2. Iridium – 192.
3. Isocentric technique.
4. Maximum permissible dose.
5. Wedges.
6. Radiosensitivity.
7. Particulate radiation.
8. Hyperbaric oxygen.
9. Radiation effects on skin.
10. Percentage depth dose.

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March 2010

[KW 140] **Sub. Code: 2035**

M.D. DEGREE EXAMINATION

Branch IX – RADIO THERAPY
Paper I – (for candidates admitted upto 2007-2008) and
Part I – (for candidates admitted from 2008-2009 onwards)

MEDICAL RADIATION PHYSICS AS APLLIED TO RADIOTHERAPY AND RADIATION BIOLOGY
Q.P. Code : 202035

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

Draw suitable diagram wherever necessary.
Answer ALL questions.

I. Essay questions : **(2 x 20 = 40)**

1. Treatment planning systems in modern radiotherapy – Discuss.

2. Discuss stereotactic radio-surgery.

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

1. Neutron beam therapy.
2. Bolus.
3. Strontium 90.
4. Integral dose.
5. Image guided radiotherapy.
6. Immobilization devices.
7. T.L.D.
8. Simulator.
9. Isocenter.
10. Tissue air ratio.

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September 2010

[KX 140] **Sub. Code: 2035**

M.D. DEGREE EXAMINATION

Branch IX – RADIO THERAPY

MEDICAL RADIATION PHYSICS AS APLLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

Paper I – (for candidates admitted upto 2007-2008) and
Part I - (for candidates admitted from 2008-2009 onwards)

Q.P. Code : 202035

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

Draw suitable diagram wherever necessary.
Answer ALL questions.

I. Essay questions : **(2 X 20 = 40)**

1. Describe in detail interaction of charged particles with matter. Give one example of their clinical use.

2. Draw a neat diagram of Cobalt-60 teletherapy machine. Name its parts and describe their functions.

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

1. Filters.
2. Immobilization devices.
3. Wedge Filters.
4. Radiotherapy Verification Systems.
5. Total skin irradiation.
6. Iodine-125.
7. LDR vs HDR.
8. Occupational and public Radiation dose limits.
9. Personnel radiation monitoring devices.
10. QA of Linear Accelerator.

MAY 2011

[KY 140] **Sub. Code: 2035**

M.D. DEGREE EXAMINATION

BRANCH IX – RADIO THERAPY

MEDICAL RADIATION PHYSICS AS APLLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

Q.P. Code : 202035

Time : 3 hours (180 Min) **Maximum : 100 marks**

Answer ALL questions in the same order.

I. Elaborate on :	**Pages (Max.)**	**Time (Max.)**	**Marks (Max.)**
1. Describe in detail the different temporary interstitial brachytherapy dosage systems.	11	35	15
2. What are the various fractionation schedules and the radiobiological basis of these fractionation schedules used in EBRT.	11	35	15
II. Write notes on :			
1. Late effects of radiation in children.	4	10	7
2. HDR brachytherapy.	4	10	7
3. Beam collimation and penumbra.	4	10	7
4. Image guided brachytherapy.	4	10	7
5. Thimble chambers.	4	10	7
6. Wedge filters.	4	10	7
7. Source housing in Cobalt machines.	4	10	7
8. Quality Assurance for Linear accelerator.	4	10	7
9. TLD.	4	10	7
10. Stochastic effects.	4	10	7

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April 2012

[LA 140] **Sub. Code: 2035**

M.D. DEGREE EXAMINATION

BRANCH IX – RADIO THERAPY

MEDICAL RADIATION PHYSICS AS APLLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

Q.P. Code : 202035

Time : 3 hours **Maximum : 100 marks**
(180 Min)

Answer ALL questions in the same order.

Write notes on	**Pages (Max.)**	**Time (Max.)**	**Marks (Max.)**
1. Define Brachytherapy and describe in detail its applications.	16	35	15
2. Describe in detail the site plan and safety aspects in construction and installation of the cobalt therapy unit in your hospital.	16	35	15

II. Write notes on :

1. Describe the Gamma zone monitor.	4	10	7
2. Describe the Quality assurance.	4	10	7
3. Describe the inverse planning.	4	10	7
4. Describe the Intensity modulated radiation therapy.	4	10	7
5. Describe the Radiosensitisers.	4	10	7
6. Describe the Radiation protectors.	4	10	7
7. Describe the Repopulation and concomitant boost therapy.	4	10	7
8. Discuss continuous hyper fractionated accelerated radiation therapy.	4	10	7
9. Discuss the four R s of radiobiology.	4	10	7
10. Describe the Radiation protection.	4	10	7

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(LC 140) **APRIL 2013** **Sub. Code: 2035**

M.D. DEGREE EXAMINATION
BRANCH IX-RADIO THERAPY

MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

Q.P.Code: 202035

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

I. Elaborate on: **(2X15=30)**

1. Describe the interaction of radiation with matter.

2. Describe the four 'R's of Radiobiology.

II. Write notes on: **(10X7=70)**

1. Describe the Wedge filters and its applications.
2. Describe the Characteristics of electrons.
3. Describe the Safety devices in Teletherapy room.
4. Describe the Isocentre mounting with illustration.
5. Describe the Uncertainties in radiation therapy.
6. Describe the role of Simulators treatment planning.
7. Describe the Conformal therapy.
8. Describe the Physical basis of Image guided radiotherapy.
9. Describe the Beam modifying devices.
10. Radiobiological effect.

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[LG 140] **APRIL 2015** **Sub. Code: 2035**

M.D. DEGREE EXAMINATION

BRANCH IX – RADIO THERAPY

PAPER I – MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

Q.P.Code: 202035

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

Answer ALL questions

I. Elaborate on: **(2 x 15 = 30)**

1. Describe the medical Linear Accelerator and its advantage over a cobalt therapy machine.
2. Discuss the interaction of radiation with matter.

II. Write notes on: **(10 x 7 = 70)**

1. Personal monitoring Devices in radiotherapy.
2. Describe the Physical parameters of brachy therapy.
3. Remote After Loading technique.
4. Stereotactic Radiosurgery and its indications.
5. Discuss hyper fractionation.
6. Describe the Proton beam therapy characteristics.
7. Describe the radiobiology of concomitant Boost.
8. ICRU – 38.
9. Describe the Immobilization methods used in Radiation treatment.
10. Biological Effective dose.

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(LI 140) APRIL 2016 **Sub. Code:2035**

M.D. DEGREE EXAMINATION

BRANCH IX – RADIO THERAPY

PAPER I – MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

Q.P.Code: 202035

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

I. Elaborate on: **(2 x 15 = 30)**

1. Define Brachytherapy. Describe the radiobiological rationale for brachytherapy. What are the advantages of HDR brachytherapy over LDR brachytherapy?

2. What are Beam Modifying Devices? Explain in detail about any two of them.

II. Write notes on: **(10 x 7 = 70)**

1. Draw a block diagram of Linear Accelerator and label its parts.
2. Maximum Permissible Dose.
3. Unsealed radioisotopes.
4. Modes of cell death after irradiation.
5. Stochastic and non stochastic effects of radiation.
6. Discuss the benefit of accelerated fractionation with respect to Radiobiology.
7. Hypoxic Radiosensitizers.
8. Four field technique in carcinoma cervix.
9. Iridium-192.
10. SLD and PLD (Sublethal damage and Potentially lethal damage).

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(LK 140) MAY 2017 **Sub. Code:2035**

M.D. DEGREE EXAMINATION

BRANCH IX – RADIO THERAPY

PAPER I – MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

Q.P.Code: 202035

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

I. Elaborate on: **(2 x 15 = 30)**

1. Physical properties of electron beam and its clinical applications.

2. Describe the parts of Linear Accelerator and requirements for Housing Linear Accelerator.

II. Write notes on: **(10 x 7 = 70)**

1. Hyperthermia and Radiotherapy.
2. Afterloading Interstitial Implant systems.
3. Iodine - 131.
4. ICRU 50 – Volumes and recommendations for dose reporting.
5. Portal imaging.
6. Discuss the benefit of concomitant boost therapy with respect to Radiobiology.
7. Beam direction devices.
8. Draw a contour (Tumor volume and Organs at Risk) for a patient being treated for carcinoma of vocal cord $T_1N_0M_0$ using opposed lateral along with beam portals and isodose curves 100%, 95% and 50%.
9. Neurtrons in clinical practice.
10. Integral dose in specialized radiation techniques.

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(LM 140) MAY 2018 **Sub. Code: 2035**

M.D. DEGREE EXAMINATION

BRANCH IX – RADIO THERAPY

PAPER I – MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

Q.P.Code: 202035

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

I. Elaborate on: **(2 x 15 = 30)**

1. Describe the beam modifying devices with suitable illustrations.
2. Describe in detail the applications of particle therapy.

II. Write notes on: **(10 x 7 = 70)**

1. Thermoluminiscence dosimeter.
2. Daily quality assurance in Telecobalt therapy.
3. Linear energy Transfer.
4. Iridium 192.
5. Repopulation in Radiobiology.
6. Immobilisation devices.
7. Compton Effect.
8. Describe the physical aspects of V-MAT technique.
9. LQ model.
10. Electron therapy.

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(LO 140) MAY 2019 **Sub. Code: 2035**

M.D. DEGREE EXAMINATION

BRANCH IX – RADIO THERAPY

PAPER I – MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

Q.P. Code: 202035

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

I. Elaborate on: **(2 x 15 = 30)**

1. Describe the biological basis of fractionation and the various types of altered fractionation.
2. Describe intensity modulated radiotherapy and clinical use.

II. Write notes on: **(10 x 7 = 70)**

1. Interstitial brachytherapy.
2. Compensators.
3. Equivalent dose.
4. Isodose curves of gamma rays.
5. Linear quadriatic model.
6. Radioprotectors.
7. Hypoxic cell sensitizers.
8. Proton therapy.
9. Low level radiation effects.
10. Stereotactic body radiotherapy.

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[LQ 140] AUGUST 2020 **Sub. Code: 2035**

(MAY 2020 SESSION)

M.D. DEGREE EXAMINATION

BRANCH IX – RADIO THERAPY

PAPER I – MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

Q.P. Code: 202035

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

I. Elaborate on: **(2 x 15 = 30)**

1. Draw a block diagram of Linear Accelerator and label its parts. Discuss the recent advances made with respect to Linear Accelerator.
2. What are the various interactions of radiation with matter? Explain in detail with suitable diagram.

II. Write notes on: **(10 x 7 = 70)**

1. Biological Equivalent Dose (BED) and its applications.
2. Explain the principles of Radiation Protection with a note on Personnel Monitoring Devices and Maximum Permissible Dose (MPD).
3. What is QUANTEC? What are its advantages? Discuss its applications
4. Compare and contrast SSD and SAD.
5. Factors that modify radiation response.
6. Radioisotopes used for treatment of bone metastases
7. Discuss the physical characteristics of two commonly used HDR brachytherapy sources. Explain the ideal characteristics required for brachytherapy sources.
8. Discuss the benefit of Accelerated Fractionation with respect to Radiobiology.
9. Stochastic and non-stochastic effects of radiation.
10. Particle therapy

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[LS 140] NOVEMBER 2020 **Sub. Code: 2035**

(OCTOBER 2020 SESSION)

M.D. DEGREE EXAMINATION

BRANCH IX – RADIO THERAPY

PAPER I – MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

Q.P. Code: 202035

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

I. Elaborate on: **(2 x 15 = 30)**

1. Explain the various principles of radiation protection and give a note on personnel monitoring devices. Discuss factors that are to be taken into consideration for designing a treatment room for teletherapy machine.

2. What are Beam modifying devices? Explain in detail about any two of them. What is FFF and what are its benefits.

II. Write notes on: **(10 x 7 = 70)**

1. What are unsealed radioisotopes? Write short notes on pure Beta Emitters.
2. Define Brachytherapy. Describe the radiobiological rationale for brachytherapy.
3. Fraction Size and Overall Treatment Time: its influence on early and late responding tissues
4. Discuss the benefit of concomitant boost therapy with respect to Radiobiology.
5. Hypoxic cell sensitizers
6. Explain the relationship between LET, OER and RBE.
7. Therapeutic Ratio
8. Discuss the rationale, patient selection criteria and technique and doses of Intra Operative Radiation Therapy (IORT) along with 2 examples.
9. What is thermotolerance? Discuss role of hyperthermia in cancer management.
10. Radioimmunotherapy

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[MD 0721] JULY 2021 **Sub. Code: 2035**

(MAY 2021 SESSION)

M.D. DEGREE EXAMINATION

BRANCH IX – RADIATION ONCOLOGY

PAPER I – MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

Q.P. Code: 202035

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

I. Elaborate on: **(2 x 15 = 30)**

1. Draw and explain the mammalian cell survival curve. Write about the mathematical models describing the cell survival curve.

2. Briefly describe oxygen enhancement ratio and ways to overcome hypoxia. What is the importance of oxygen in the action of radiation?

II. Write notes on: **(10 x 7 = 70)**

1. Pathophysiology of pain and its management in cancer patients.
2. TLD badge.
3. Dynamic wedges.
4. Liquid based cytology.
5. Tissue air ratio.
6. Stochastic effect.
7. Bragg Peak.
8. What is crude and actuarial survival?
9. EPID.
10. Photon electron field isodose.

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

[MD 0522] **MAY 2022** **Sub. Code: 2035**

M.D. DEGREE EXAMINATION

BRANCH IX – RADIO THERAPY
BRANCH XXVI - RADIATION ONCOLOGY

PAPER I – MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

Q.P. Code: 202035

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

I. Elaborate on: **(2 x 15 = 30)**

1. Describe total body irritation in detail.
2. The IMRT workflow in a stage IIB cervical cancer patient and describe the factors considered while evaluating and approving an IMRT plan for such a patient.

II. Write notes on: **(10 x 7 = 70)**

1. Proton Therapy.
2. Gamma Knife.
3. SBRT.
4. Build up and Clinical Implications.
5. High LET particles in Radiotherapy.
6. DNA repair pathways.
7. Mechanism of Cell killing.
8. Cell Survival Curve.
9. Inverse Dose Rate Effect.
10. Hyperthermia.

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

[MD 1022] **OCTOBER 2022** **Sub. Code: 2035**

M.D. DEGREE EXAMINATION

BRANCH IX – RADIO THERAPY

PAPER I – MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

Q.P. Code: 202035

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

I. Elaborate on: **(2 x 15 = 30)**

1. Draw a block diagram of Linear Accelerator and label its parts. Discuss the recent advances made with respect to Linear Accelerator.

2. Field matching techniques available and explain it in detail with respect to Medulloblastoma.

II. Write notes on: **(10 x 7 = 70)**

1. ICRU 50, 62.
2. Short notes on Simulator.
3. Tongue and groove effect.
4. LET and RBE.
5. Radiation induced chromosomal aberrations.
6. Rotational Therapy.
7. DVH.
8. QUANTEC and HyTEC.
9. Hypo fractionation.
10. Beam Modifying devices.

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

[MD 0723] **JULY 2023** **Sub. Code: 2035**

(MAY 2023 EXAM SESSION)

M.D. DEGREE EXAMINATION

BRANCH IX – RADIO THERAPY
BRANCH XXVI - RADIATION ONCOLOGY

PAPER I – MEDICAL RADIATION PHYSICS AS APPLIED TO RADIOTHERAPY AND RADIATION BIOLOGY

Q.P. Code: 202035

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

I. Elaborate on: **(2 x 15 = 30)**

1. Describe in detail about Stereo Tactic Radiotherapy Systems and their clinical applications.
2. Discuss in detail about various methods of Radiation dose Measurement and their clinical utilities.

II. Write notes on: **(10 x 7 = 70)**

1. Oxygen Enhancement Ratio and its significance.
2. Integral dose.
3. Scattering foil.
4. Tumor microenvironment.
5. Ophthalmic Irradiators.
6. Alpha Emitters and Beta Emitters.
7. Pair production.
8. DNA Repair.
9. Radio protectors.
10. Altered fractionation schedules.

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