

**Pravara Institute of Medical Sciences
(Deemed University)**

Loni Bk - 413 736, Tal. Rahata, Dist. Ahamadanagar (M.S.)

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**Syllabus
M.D. (Radiotherapy)**

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Pravara Institute of Medical Sciences
(Deemed University)



DEPARTMENT OF RADIOTHERAPY
RURAL MEDICAL COLLEGE
Loni Bk., Tal: Rahata, Dist: Ahmednagar-413736

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RURAL MEDICAL COLLEGE
DEPARTMENT OF RADIOTHERAPY & ONCOLOGY
THREE-YEAR MD & TWO YEAR D.M.R.T. TRAINING PROGRAMME

GOALS & OBJECTIVES

Radiotherapy is a clinical and scientific discipline of Medicine devoted to the management of patients with cancer and other disease by ionizing radiation, alone or combined with other modalities like Surgery and Chemotherapy.

General :

At the end of the training program, it is hope that the trainees will be competent, safe, compassionate and ethical in their practice of oncology and would not only contribute to the future development in oncology but will serve the needy peoples.

Specific :-

1. The trainee should acquire a sound working knowledge of practice of radiotherapy using ionizing radiation .
2. The trainee should have knowledge of use of chemotherapeutic agents, hormones, radio sensitizers & radio protectors, biological response modifiers in the management of cancer.
3. The trainee should be competent in providing palliative care in advanced and terminally ill cases.
4. The trainee should develop a responsible oncologist who can take proper decision after proper reasoning / logical thinking.
5. The trainee should have good knowledge of Cancer Prevention, early detection, rehabilitation and emotional problems involved in the preventive oncology.
6. The trainee should develop into a responsible oncologist with quality of leadership, management and administrative skills.

Three year training comprise of the following:-

1. Induction programme for all new trainees.
2. Theory and practical sessions.
3. MD dissertation.
4. Departmental academic activities including seminars, journal clubs, ward rounds, planning meetings etc.
5. Joint clinics
6. Clinical data analysis- As instructed by the teacher
7. Paper presentation at conferences.
8. Interaction with other related department.

For practicals the students will maintain individual diary /logbook, which will be received and endorsed by the teacher, under, whom the candidate is registered .The individual teacher will be responsible for checking the progress of the candidate.

Trainee should discuss with their teacher regarding topic for presentation at clinical meetings, clinical data analysis and paper for presentation at conferences. The presentation should be on transparencies / slide with neat labeled diagram whenever necessary. The subject should be prepared well in advance and discussed with the individual teacher, of a week before presentation. The literature search from journals and books or Internet is mandatory for second and third year students.

INDUCTION / ORIENTATION PROGRAMME FOR NEW TRAINEES

Two sessions (am or pm) Each In the First Six to Eight Weeks

Objectives:-

The induction programme is intended to give the new trainees a general idea about Pravara Rural Hospital [PMT], the nature of work done in various departments and the location of various departments. The emphasis will be on the departments of Radiation Oncology, Medical Physics, and frequently used diagnostic and rehabilitative services. The Senior Resident will introduce and guide the new students to various facilities listed below.

1. Teletherapy Machines (To know about the machines available in the hospital ; Energy accessories types of treatment possible, operation of machines)
2. Brachytherapy Machines , Theater (Types of procedure done; care and special instruction taken during loading and removal of radioactive sources, Learn about radiation protection measures.
3. Computer treatment planning, Physics (Simple plans, isodose charts)
4. Mould room & simulator (making POP, acrylic and orfit moulds, Alloy blocks, Tissue compensators, Bolus and surface moulds etc.)
5. Radiotherapy in patients: (Visit to wards, patients management with IV fluids, care of patients admitted to wards, management of radiation reactions general aspects)
6. I.V. team and Day care: Various investigations, IV access & chemotherapy administration.
7. Other rehabilitative service such as palliative care, Occupational and physiotherapy, Medical social workers, and voluntary organization.
8. Interaction with other related department.

M.D.(RADIOTHERAPY) SYLLABUS

Paper I: Basic Medical Sciences as applied to Radiotherapy

1. Applied Anatomy and Physiology

- a) Anatomy of oral cavity , larynx ,pharynx ,paranasal sinuses, CSF pathways, salivary glands, middle ear, breast, broncho-pulmonary segments, mediastinum,oesophagus, liver, spleen, small and large bowls, pelvic and genito- urinary organs (bladder, uterus, ovary, testis, rectum anal canal etc)
- b) Lymphatic system and drainage
- c) Relationship of vital structures
- d) General principles of physiology of respiratory ,cardio-vascular ,nervous and biliary systems

2. Pathology of Benign and Malignant diseases

- a) Principles and methods of definite diagnosis surgical biopsy

- b) Exfoliative Cytology ,Fine needles aspiration Cytology and biopsy
- c) General histological & cytologic features of malignancy.
- d) Classification of benign and malignant tumours and their interpretation
- e) Methods of dissemination of cancer and its biological behaviour
- f) Degree of differentiation of cancer
- g) Radiation Pathology

3. Various investigation and Imaging procedures in Diagnosis, Staging, Management and Follow up of different types of Cancer.

Paper II: Clinical Radiotherapy including Chemotherapy

1. Clinical Practice of Radiotherapy and Oncology

- a) Principles of Radiotherapy
- b) Techniques of Radiotherapy
- c) Clinical Practice
- d) Treatment Planning and Presentation

2. Diagnosis and management of following cancers

- a) Central nervous system, Ocular and Adnexal tumour ,Ear tumours, head and neck tumors, Salivary gland, Thyroid
- b) Endocrine system, Breast cancer, Bronchus ,G.I. cancers ,Urogenital system, Skin cancer, Bone tumours, Soft tissue tumours, Leukamia ,Lymphoma ,Cancer in childhood, Multiple Myeloma ,Aids-related cancer.
- c) Total body & Hemi body irradiation.

3. Cancer Chemotherapy, Hormones and Immunotherapy

- a) Chemotherapy: Structure, mechanism of action, pharmacokinetic, indication, doses, schedules, side effects and interaction
- b) Hormone therapy
- c) Immunotherapy
- d) Gene Therapy

4. Related Specialities

- a) Principles and Practice of general surgery, gynaecology & paediatric surgery as related to cancer, Surgical treatment decisions ,Surgical diagnosis and staging of cancer, Clinical staging. Staging procedures, Methods of clinical staging and TNM classification
- b) Terminal care of cancer patients, Principles and practice of control of pain.
- c) Cancer registry and epidemiology
- d) Prevention and early detection in cancer

- e) Cancer education and oncology organization
- f) Statistical methods.

Paper III: Physics as applied to Radiotherapy, Nuclear Medicine & Radiobiology

(A) Physics

1. Atomic and Nuclear Structure
2. Radioactive Decay including artificial & natural radioactivity
3. Production and properties of X-rays
4. Clinical Radiation Generators
5. Interactions of ionizing radiation with matter
6. Brachytherapy
7. Measurement of ionizing radiation: Dosimetric aspects
8. Radiation Quantities & Quality assurance
9. Calibration of High Energy Photon and electron Beams
10. Dose Distribution of External Beam Therapy
11. TPS & Manual treatment planning
12. Radiation Protection & Hazards
13. Planning of New Radiotherapy Department and maintenance

(B) Nuclear Medicine

1. Radioactive Isotopes in Clinical Medicine and Clinical diagnosis
2. Sealed and unsealed source
3. Types of diagnostic test
4. Organ scanning
5. Gamma Camera & Whole body counter
6. Calibration and standardization of Radioactive Isotopes
7. Internal therapeutic uses of Radioactive Isotopes and their dosimetry

(C) Radiobiology

1. Mammalian Cell Radiosensitivity: Interphase and reproductive death, Cell Survival curves in vivo, Characterization of cell survival curves, Critical sites and target theory, Dose response curves in vivo, Quantitative normal tissue reaction based on systems.
2. Factors that modify Radiation Response: The oxygen effect, The age response function, Potentially lethal damage, Sublethal damage, Dose Rate, Radiosensitizers, Radioprotectors.
3. Linear Energy Transfer (LET) and Relative Biological Effectiveness (RBE)
4. Cell and tissue Kinetics: The cell cycle, Autoradiography, Constituent parts of the cell cycle, Portent labelled mitoses technique, Growth fraction, Cell loss factor, Growth Kinetics of human tumours.

5. **Tissue Radiosensitivity:** Classification based on radiation pathology, Types of cell populations.
6. **Time-dose and Fractionations:** The 4 R's of radiobiology, The basis of Fractionations, The Strandquist's plot, Nominal standard dose, Linear Quadratic equation.
7. **New Radiation Modalities:** Protons, Neutrons, Pions, High energy heavy ions.
8. **Hyperthermia:** Methods for heating, Systematic hyperthermia, Localised heating, Cellular response to heat, Repair of thermal damage, Thermotolerance, Hyperthermia combined with ionizing radiation, Time sequence of heat and irradiation, Hypoxic cells and heat, Effect of pH on the response of Hypothermia, Response of transplanted tumours to heat, Response of spontaneous tumours to heat, Response of normal tissues to heat, heat and therapeutic gain factor, Hyperthermia and Chemotherapy.
9. **Total body Irradiation and its acute effects:** Prodromal radiation syndrome, Central nervous system /cerebrovascular system, Gastrointestinal syndrome, Hematopoietic syndrome, Mean Lethal dose, Treatment of radiation accidents
10. **Total body Irradiation and its Late Effects:** Non-specific life shortening, Carcinogenesis.
11. **Mechanism of Radiation Carcinogenesis and Genetics of irradiations.**
12. **Radiation protection in the Developing Embryo and Fetus.**
13. **Radiophysiology of human Tissues:** Effects of irradiation of the skin, bone & cartilage, kidney, lung, nervous tissues, ovary, testis, eye, lymphoid tissues, bone marrow, oral, pharyngolaryngeal & esophageal mucous membrane, salivary glands, human embryo and Radiation effects observable in clinical radiotherapy.

Paper IV: Recent Advances in Radiotherapy

1. Recent advances in field of Radiotherapy & delivery methods including machines, modifiers and immobilisation devices.
2. Recent advances in chemotherapeutic drugs including recent trials.
3. Recent advances in field of Radiobiology.
4. Recent advances in diagnostic aspects of oncology.
5. Current trends in Radionuclides.
6. Current recommendation in management in clinical oncology.
7. **New Radiation Modalities:** Protons, Neutrons, Pions, High energy heavy ions.
8. **Hyperthermia:** Methods for heating, Systematic hyperthermia, Localised heating, Cellular response to heat, Repair of thermal damage, Thermotolerance, Hyperthermia combined with ionizing radiation, Time sequence of heat and irradiation, Hypoxic cells and heat, Effect of pH on the response of Hypothermia, Response of transplanted tumours to heat, Response of spontaneous tumours to heat, Response of normal tissues to heat, heat and therapeutic gain factor, Hyperthermia and Chemotherapy.
9. Current trials as being published in standard Oncology/Radiotherapy journals.
10. IMRT, IGRT, SRS, SBRT, Tomotherapy

11. Heavy ion therapy (Proton & Neutron)

12. HIFU, HIPEC, HBOT etc.

13. **Newer Approaches to Cancer Treatment:**

Gene Therapy, Cancer Vaccines, Immunotoxin Therapy, Antisense Inhibition of Gene Expression, Antiangiogenic Therapy, Radiation and Chemotherapy Protectors, Intensity Modulation of the Radiation Beam, Fractionated (Relocatable) Stereotactic Radiotherapy, Molecular Targets for Drug Development.

Quality Assurance, Recent Advances in Radiation Therapy, Altered Fractionation, Biologic Modeling and Plan Evaluation, Conformal Therapy, Proton Therapy, Neutron Brachytherapy, Neutron Capture Therapy, Neutron Beam Therapy, Heavy Ion and Pion Therapy, Physics of High Linear Energy Transfer (LET) Particles and Protons, Intra-operative Radiation Therapy, Hyperthermia, Three-Dimensional Physics and Treatment Planning, Stereotactic Irradiation

YEARLY COURSE DETAILS

<<<<<< FIRST YEAR >>>>>>

CLINICAL ONCOLOGY [Theory] – first year

1. Introduction to Oncology.
2. Principles of clinical and pathological staging of cancers
3. Basics of Radiation Therapy
4. Basics of cancer chemotherapy
5. Basics of cancers surgery
6. Decision making process in oncology
7. Combined modality of RT + Surgery
8. Combined modality of RT + Chemotherapy
9. Basics of Radiation treatment planning: Clinical aspects.

CLINICAL ONCOLOGY [PRACTICALS]- First year (Patient Evaluation, care & procedures)

1. communication with cancer patients and their relatives
2. Clinical examination method like gynecological, laryngeal, breast, neurological, and lymph node examination.
3. Obtaining informed consent for routine treatment.
4. Management of treatment complications like mucositis, dermatitis, proctitis, diarrhea, nausea, vomiting, xerostomia, lymphoedema, candidacies etc.
5. Management/ care of patients with fluid electrolyte imbalance, malnutrition, neutropaenic sepsis, raised intracranial pressure, seizures, paraplegia, bed sores, tracheotomy, NG tube or gastrostomy, bleeding PV or SVC compression.
6. Cervical biopsy PAP smear FNAC Pleural and peritoneal paracentesis, bone marrow and lumbar puncture.
7. Insertion and maintenance of IV lines (butterfly and Venflon types) for blood collection and giving fluids or cytotoxic agents.
8. Patient positioning and immobilization using ORFIT, ACRALYC, and POP Masks
9. simple Simulation techniques of e. g. Cervix 2 or 4 field, Bone Metastases, lung AP/PA Esophagus 3 field and head and neck Bilateral Fields.
10. Cervical and Intra uterine applications.
11. Giving simple chemotherapy drugs likes 5-FU, Bleomycin cyclophosphamide, low dose methotrexate (CMF) procarbazine, CCNU, Cisplatin, Adriamycin etc.
12. Interpreting simple Radiographs like chest x-rays, barium swallows, osseous metastases, bone scan etc.

13. Be familiar and follow the established principles of bio-safety e.g. MRSA, Hepatitis B and C, HIV etc

PHYSICS [Theory] -first year

1. Electromagnetic radiation and the atomic structure
2. Radioactivity
3. Radioactive sources use in radiotherapy
4. Production of X Rays: The basic X Ray tube
5. Interaction of X Rays With matter
6. Teletherapy machines: Telecobalt & linac
7. The Roentgen and its measurement
8. Machine calibration and acceptance test quality assurance
9. Principles of radiation protection
10. Beam modifying devices
11. ICRU guidelines : Teletherapy & Brachytherapy
12. Basics of treatment planning and Dosimetric physical aspects.

PHYSICS [Practicals] – First year

1. Parts and functions of various Teletherapy and brachytherapy machines
2. Radiation protection
3. Calculation of output from ^{60}Co machine
4. Treatment time calculation for simple fields (open regular)
5. Quality control and machine calibration
6. Isodose curves and manual treatment plans using isodose curves

RADIOBIOLOGY [Theory] – First year

1. Cell survival curve
2. cell tissue and tumor kinetics
3. Factors affecting radiosensitivity
4. I ED, OER, and RBE
5. Radio-sensitizers
6. Radio-protectors
7. Hyperthermia
8. Acute and late effects of whole body irradiation
9. Radiation Carcinogenesis

CANCER BIOLOGY [Theory] - First year

1. Cellular structure and function
2. Cell membrane and Cytoplasm
3. Nucleus
4. Signal pathway
5. Cell cycle control and cancer
6. Hyperplasia, dysplasia and neoplasia
7. Oncogenes – Introduction
8. Metastasis Carcinogenesis and metastatic cascade
9. Human Genome Project

<<<<<< SECOND YEAR >>>>>>

CLINICAL ONCOLOGY [Theory] – Second year

1. Head, neck, oral & PNS cancers

2. Oral Cavity & Oropharyngeal cancers
3. Cancers of Hypopharynx and larynx
4. Tumours of salivary glands, ear, orbit, and Thyroid
5. Management of CNS Tumours
6. Lung cancer and Mediastinal tumors
7. Principles of CT and MR imaging
8. Oesophageal and gastric
9. Pancreas, Bile duct and liver cancers
10. Cancers of Colon, Rectum & Anal canal
11. Oncological emergencies
12. Management of Breast cancer
13. Cervical cancer
14. Cancers of the uterus, Ovary, Urethra etc.
15. Kidney, prostate, bladder, and penile cancers
16. Testicular tumours
17. Adult leukaemias
18. Chronic leukaemias and myeloma
19. Non-Hodgkin's lymphoma
20. Kaposi's disease and mycosis fungoides
21. Bone tumours
22. Soft tissue sarcoma and skin cancers

CLINICAL ONCOLOGY [Practicals] – Second year

1. Knowledge about treatment options and decision making for various cancers.
2. Discussing Randomized Trails with patients and obtaining their consent.
3. Management of patients with Renal failure G.I. obstruction, SVCO, TOF, Cord compression, severe vaginal bleeding neutropaenic sepsis, hypercalcaemia, necrosis, pathological fractures etc.
4. Management of patients in severe pain and of dying patients, palliative care.
5. Hospice care: use of morphine
6. Divergent blocks (Mantle, Inverted Y, Rectum, Brain etc.) Electron cuts outs.
7. Simulation Techniques e.g. Conservative Breast, Mantle, Inverted Y, Dog Leg, Pancreas, Hypopharynx, PNS, Vocal Cord, Brain, Planning CT Scans.
8. Whole body irradiation
9. Computer treatment planning: Parallel opposed, antero, lateral, 3 or 4-field beam arrangement with equal and unequal weightage. Intracavitary and simple interstitial brachytherapy plans of breast, template buccal mucosa.
10. Organizing and maintaining central lines (Hickmans), Parenteral Nutrition, Cytotoxic drugs such as Doxorubicin, Vincristine, Mitoxantrone, Cisplatinum.
11. Assisting Interstitial Implants/ ILRT/ EBRT Procedures. Performing simple procedures like Intracavitary, CVS etc.
12. Finding information from medline, Internet etc.

PHYSICS [Theory] - Second year

1. Evolution of brachytherapy dosage systems
2. Manual brachytherapy dosage calculation
3. Electron beam therapy
4. Remote afterloading LDR and HDR machine
5. Computer treatment planning systems
6. Virtual modal sources for therapy
7. Principles of CT and MR imaging

PHYSICS [Practicals] Second year

1. Accurate localization of brachytherapy sources from orthogonal X-Rays and estimation of the Prescribed Dose Rate and Reference Dose Rate as per PARIS rules.
2. Complex field shapes and modified beams. computer treatment planning teletherapy (AI/EA; for 4 fields anterior/ lateral; weightage)
3. Computer treatment planning brachytherapy (CVS, Intracavitary (Selectron) breast, tongue/late buccal mucosa.)
4. Simple Conformal plans; Conformal blocks, CT planning
5. Functions of RSO
6. HDR & LDR Surface mould treatment execution.

RADIOBIOLOGY [Theory] – Second year

1. Acute and late responding tissue and dose response relationship
2. Time Dose Fractionation and the evolution of bioeffect models
3. Linear Quadratic Model
4. In vivo assays of radiation response
5. Radiation effect on embryo & Foetus

RADIOBIOLOGY [practicals] – Second year

1. Calculation of Biological Effective Doses for tumour control, acute and late effects using the LQ model.
2. Use of Radio sensitizers or radio protectors (eg. Amifostine).

CANCER BIOLOGY [Theory] – Second year

1. Genetic predisposition to cancer
2. Proto Oncogenes and tumour suppressor genes
3. Basic principles of molecular biology techniques e.g. PCR, FCM, Electrophoresis, cloning etc.
4. Tissue culture techniques and clonogenic assays.

 <<<<<< THIRD YEAR >>>>>>

CLINICAL ONCOLOGY [Theory] – Third year

1. Management of paediatric solid tumours
2. Histological features of round cell tumours and paediatric solid tumours
3. Biology & Pathology of Lymphoma
4. Pathology of Bone Tumours and STS
5. Intra-cavitary brachytherapy in Head and Neck cancers
6. Cytological Brachytherapy
7. Problem solving in areas and difficult cases
8. The Truth about cancer: When to tell, How much to tell & whom?
9. Is Quality of life an important outcome measure of curative palliative treatment? Factors affecting the Quality of life.
10. Quality of life assessment tools for clinical trails and routine practice
11. Symptom control in advanced cancer
12. Care of the dying patients and Hospice care
13. Medical ethics: A clinician's perspective
14. Ethics in Biomedical research
15. National cancer control programme
16. Screening for common cancers : Pragmatic approaches for our country
17. Palliation of cancer patients
18. Chemotherapy in head and neck cancers
19. Non-operative RT in gastric, oesophageal and renal cancers

20. Surgery versus Radical Radiotherapy in prostate and bladder cancers
21. Oropharyngeal cancer
22. Setting up Radiotherapy Departments in India. Equipment and facilities needed?
23. Oncologists as managers of Health care system.

CLINICAL ONCOLOGY [Practicals] - Third year.

1. Complex Simulation and treatment techniques e.g. asymmetric beam, TSET, Craniospinal Irradiation, Paediatrics tumours, TBI.
2. Treatment planning of mixed beam, matching fields electrons, head and neck implants
3. Intracavitary ILET, and simple implants
4. primary surface moulds
5. Applying EBRT, Head/Neck Implants, Templates
6. Cytotoxic drugs e.g. Taxenes, ECNU, High Dose Methotrexate, Interferon, G-CSF, Etoposide etc.

PHYSICS [Theory] – Third year

1. Principles and practice of stereotactic RT
2. IMRT and SPECT
3. Dosimetric aspects of magna field therapy
4. Complex field arrangements and mixed beam, electrons arcs, matching fields asymmetric beams
5. Recent developments and future trend in RT planning and treatment delivery

PHYSICS [Theory] – Third year

1. 3 dimensional conformal planning
2. Intra-cavitary portal imaging
3. Networkng
4. Quality assurance tests in stereotactic radiotherapy

RADIOBIOLOGY [Theory] – Third year

1. Dose rate effect in Brachytherapy
2. How to compensate for missed treatment days?

CANCER BIOLOGY [Theory] – Third year

1. Molecular basis of radiation sensitivity
2. Molecular basis of cytotoxic drug action and drug resistance
3. Immunological aspects of cancers and cancer vaccines.
4. Antisense and Gene therapy

MD-Dissertation

1. Every candidate pursuing degree course is required to carry out work on a selected research project under the guidance of a recognised post graduate teacher. The results of such a work shall be submitted in the form of a dissertation.
2. The dissertation is aimed to train a post graduate student in research methods and techniques. It includes identification of a problem, formulation of a hypothesis, search and review of literature, getting acquainted with recent advances, designing of a research study, collection of data, critical analysis, comparison of results and drawing conclusions.
3. Every candidate shall submit to the Registrar (Academic), RGUHS, in the prescribed form a short synopsis containing particulars of proposed dissertation work six months from the date of commencement of the course on or before the dates notified by the University. The synopsis shall be sent through the proper channel.
4. Short synopsis will be reviewed and the dissertation topic will be registered by the

University. No change in the dissertation topic or guide shall be made without prior approval of the University.

5. The dissertation should be written under the following headings:

- i. Introduction
- ii. Aims or Objectives of study
- iii. Review of Literature
- iv. Material and Methods
- v. Results
- vi. Discussion
- vii. Conclusion
- viii. Summary
- ix. References (Vancouver style)
- x. Tables
- xi. Annexures

6. The written text of dissertation shall be not less than 50 pages and shall not exceed 150 pages including references, tables, questionnaires and other annexures. It should be neatly typed in double line spacing on one side of paper (A4 size, 8.27" x 11.69") and bound properly. Spiral binding should be avoided. The dissertation shall be certified by the guide, head of the department and head of the Institution.

7. Six copies of dissertation thus prepared shall be submitted to the Registrar (Evaluation), six months before final examination on or before the dates notified by the University.

8. The dissertation shall be valued by examiners appointed by the University. Approval of dissertation work is an essential precondition for a candidate to appear in the University examination.

M.D. Dissertation Evaluation

M. D. dissertation should preferably be a prospective study that allows the candidate to form a hypothesis, design / conduct an appropriate study and analyze / discuss the results. The trainee should decide the topic within the first 6 months after discussing with the teacher. the progress made should be reviewed at the end of each six months period and signed by the trainee and the teacher on this page.

Title of Study:

Date	Work done	Teachers comments Signature & date
First Review		
Second Review		
Third Review		
Fourth Review		

Date	Work done	Teachers comments Signature & date
Fifth Review		
Sixth Review		

Dissertation Submitted to the University on _____.

University Examination after completing three years of training and submission of M.D. Dissertation to the University before the last date of submission.

Marks Distribution for M.D. Radiotherapy Examination

Total Marks: 800 (Theory-400 + Practical-400)

	<u>Total Marks</u>	<u>Duration</u>
I. <u>Theory</u> *	400	4x3= 12 Hours
1. Paper I- Basic Medical Sciences as applied to Radiotherapy	100	3 hours
2. Paper II- Clinical Radiotherapy including Chemotherapy	100	3 hours
3. Paper III- Physics as applied to Radiotherapy, Nuclear Medicine & Radiobiology,	100	3 hours
4. Paper IV- Recent Advances in Radiotherapy	100	3 hours

*Each theory paper has

Full Questions	3 x 20 marks =	60 Marks
Short Notes	4 x 10 marks =	40 Marks
Total		= 100 Marks

II. Practical and Viva-voice for M.D. Radiotherapy

Total Marks-400

Duration- 6 hours.

1. Long case:	100x1= 100
2. Short Case:	50x2= 100
3. Pathology specimen (Spot)	20
4. Instruments:	20
5. Chemotherapy drugs & Charts	20
6. Medical Physics Equipments	20
7. CT / MRI / Nuclear Medicine scan	20
8. Grand Viva	Radiotherapy 60 + Medical Physics 40 = 100

Grand Total 40