

THE TAMIL NADU Dr. M.G.R. MEDICAL UNIVERSITY
No. 69, ANNA SALAI, GUINDY, CHENNAI – 600 032.

M.D. / M.S.

POST GRADUATE DEGREE COURSES



SYLLABUS AND CURRICULUM

2021 - 2022

M.D. RADIATION ONCOLOGY

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

M.D. RADIATION ONCOLOGY

(Change of M.D.(Radio Therapy) to M.D. (Radiation Oncology) as per
MCI PG Regulation-2000, from admission made in the Academic Year 2018-2019 onwards,
it was approved 57th SAB held on 04.06.2019

1. GOAL

The main goal of the radiation oncology residency program is to produce radiation oncologists with the necessary knowledge, skill and attitude to prevent, diagnose, manage and follow up various cancers.

To provide specialist catering high quality health care to cancer patients and advance the cause of science.

2. OBJECTIVES

As a result of training in radiation oncology, the resident should become competent in the use of the various diagnostic methods, radiation equipments, techniques, treatment planning, radiation dose prescription, treatment verification, treatment delivery; chemotherapy administration and management of related complications.

The resident to acquire complete knowledge in diagnosis and comprehensive management with radiotherapy and non surgical modalities of diagnosis and treatment.

In order to be considered a competent radiation oncologist, a resident must possess humanistic qualities, attitude and behavior necessary for the development of appropriate patient-doctor relationship.

As per WHO, the residents after completion should be guiding and coordinating cancer prevention and control, screening and early detection, rehabilitation, palliative and terminal care programme.

(A) KNOWLEDGE

1. Proper history taking and clinical examination
2. Understand anatomy pathology and natural history of common neoplasms.
3. Learn the algorithmic approach to image these patients based on the suspected disease, its biological behavior and potential and limitations of various imaging modalities.

4. Perform appropriate investigation (both conventional and advanced methods), interpret the results and reach at a reasonable diagnosis/differential diagnosis based on the clinical and biochemical results.
5. Interpretation of results and to come up with the treatment plan for the individual.
6. Should acquire general knowledge of general medicine, surgery, head and neck region, gynecology and pathology.

(B) ATTITUDE

1. To be aware of the department protocol in the management of patient
2. To be competent enough to break the bad news
3. To be able to differentiate the radical vs palliative intent of treatment and effectively communicate with the patient and relatives
4. To communicate a balanced view of the advantages, disadvantages, risks and benefits of various forms of treatment appropriate to individual patients
5. To communicate effectively with relatives
6. To help deal with disappointment
7. To be involved in the initial management of complaints
8. To obtain consent appropriately
9. To keep good records
10. To identify priorities
11. To attempt by conscientious care to recognize problems early
12. To allocate resources and call for assistance appropriately
13. To be aware of local audits and self audit
14. Adopt ethical principles in all aspects of his/her practice. Professional honesty and integrity are to be fostered. Care is to be delivered irrespective of the social status, caste or religion of the patient.
15. To teach and undertake training session for students and health workers in cancer prevention and care.

(C) SKILLS

1. Competence in history taking, physical examination, formulating diagnosis, identifying etiology, ordering further investigation, planning comprehensive management including pharmacological treatment and radiotherapy.
2. Be familiar with literature search and computer skills.
3. Constant update of knowledge including advanced diagnostic methods and radiotherapeutic management
4. Critically review and comment on research papers and make oral presentations.

5. Prepare research protocols, conduct experimental studies analyze and solve clinical and experimental problems.
6. To plan and coordinate community based screening, early detection and awareness programme including community based research projects.
7. To be able to interact with government and other agencies as a nodal person for planning and development of specialty of Radiation Oncology.

3. COMPONENTS OF THE POSTGRADUATE CURRICULUM

Theoretical Knowledge

1. A student should have good knowledge of basic sciences as applied to Clinical Oncology and Radiotherapy and medical physics.
2. Should acquire in-depth knowledge of Cancer diagnosis, staging, management and follow up including recent advances.
3. Should have basic knowledge to identify co-existing physical, social, economical and psychiatric problems.
4. Should be knowledgeable about cancer registry, National health care plans for NCDs, national cancer control program at various levels of health sectors, preventive oncology, various cancer screening methods and their implications.
5. Should be knowledgeable about epidemiology of cancers and preventive oncology including various cancer screening methods and their implications.
6. Should have knowledge of role of radiation safety officer and radiation protection supervisor; the necessity and requirements of controlled area and supervised area and their location in the radiation facility.
7. Should have basic knowledge about procedures in case of spill of radioactive source material.
8. Should have knowledge of quality assurance practice and procedures for dealing with errors of treatment delivery.
9. Should have knowledge of treatment of depression in cancer patients using counselling and drugs.

Practical and Clinical Skills

1. Competence in history taking, physical examination, formulating diagnosis, identifying etiology, ordering further investigation, planning comprehensive management including pharmacological treatment and radiotherapy.
 2. Competency in various radiotherapy planning process including simulation, imaging contouring, treatment calculation, verification and delivery with or without supervision
 2. Develop effective communication skills including breaking bad news and counselling during end of life care
 3. Acquire skills to lead a multi disciplinary team of nurses, Medical Physicists and Technologists and social workers
 4. Skills to be learnt in modules under supervision followed by independently in view of importance of patient safety during training; Provision of skill laboratory is mandatory.
- Teaching: He / she should learn the basic methodology of teaching and develop competence in teaching medical and paramedical students.

Writing Thesis/Research Articles

Research: He / she should know the basic concepts of the research methodology, and plan a research project. Basic knowledge of statistics is also required.

Attitudes including Communication Skills

HUMAN VALUES, ETHICAL PRACTICE AND COMMUNICATION ABILITIES:

1. Adopt ethical principles in all aspects of his/her practice. Professional honesty and integrity are to be fostered. Care is to be delivered irrespective of the social status, caste or religion of the patient.
2. Develop communication skills, in particular the skill to explain various options available in management and to obtain a true informed consent from the patient.
3. Provide leadership and get best out of his team in a congenial working atmosphere.
4. Apply high moral and ethical standards while carrying out human or animal research.

5. Be humble and accept limitations in his knowledge and skill and to ask for help from colleagues when needed.
6. Respect patient's rights and privileges including patient's right to information and right to seek a second option.
7. Be able to work in a multidisciplinary team, communicate and guide management with the team.

Training in Research Methodology, Medical Ethics /Bioethics and Medicolegal aspects

Research in Oncology

- 1.1 How to conduct a research
- 1.2 Guidelines for biomedical research: Animal studies, drug studies, human trial
- 1.3 Cancer clinical trials. Phase I/II, III
- 1.4 Ethics of clinical research
- 1.5 Evidence based medicine

BIOSTATISTICS: Basic principles and concepts of biostatistics as applied to health sciences - basic concepts of probability, mean, standard deviation, binomial expression, Analysis of variance, Co-efficient of correlation, Chi square test, Parametric data, Non parametric data, Regression Analysis, ROC curve, evaluation of a new diagnostic procedure etc.,

Medical Ethics – Autonomy & Consent, Equality, Justice & Equity, Privacy & Confidentiality, Benefit & Harm, Human dignity & Human rights, Vulnerable population, Gender disparity and protection, Ethics & Professionalism

- Students should compulsorily attend the research Methodology workshop conducted by the University within first six months of the M.D course.
- Students are encouraged to attend workshops/CME's on Bioethics conducted by the University and other reputed Institutions.
- Medical ethics/bioethics, moral and legal issues and Medical audit are part and parcel of the curriculum and syllabus.

4. THEORY SYLLABUS

1. BASIC SCIENCES

1.1 Anatomy

- 1.1.1 Knowledge of surface anatomy pertaining to Oncology
- 1.1.2 Knowledge of the anatomy of all organs
- 1.1.3 Knowledge of the lymphatic system of all regions
- 1.1.4 Practical familiarity with the radiographic appearance
- 1.1.5 Cross sectional anatomy

1.2. Pathology

1.2.1 Definitions of & distinction between different types of growth disorders (i.e. Distinction between hyperplasia, hypertrophy, regeneration, malformation & neoplasia)

1.2.2 Malignant transformation

- a) Initiation & promotion stages of carcinogenesis
- b) Mode of origin - monoclonal, polyclonal, unifocal, multifocal
- c) Structural & functional changes in the cellular components

1.2.3 Apoptosis and cell signaling pathways

1.2.4 Mechanisms of spread

1.2.5 Local effects of tumors

1.2.6 Local & systemic reactions to tumors

1.2.7 Effects of therapy on tumors & normal tissues

1.2.8 Criteria for tumor diagnosis - macroscopic, histological & cytological uses & value of biopsy material

1.2.9 Nomenclature - solid tumors, lymphomas, leukemias

1.2.10 Classification of tumors

1.2.11 Structure & organization of tumors - vascular supply, stroma etc.

1.2.12 Systems of grading

1.2.13 Tumor Markers

1.2.14 Tumor Immunology

1.2.15 Cytogenetics, Molecular Pathology and Immunohistochemistry

1.3. Radiation Oncology Physics

The aim of this subject is to provide the future Clinical Oncologist with the knowledge of physics required in clinical practice. An understanding of the principles of planning & carrying out treatment is a necessary prerequisite & will be enhanced by the study of this subject.

A familiarity with the physics of atomic structure & electromagnetic radiation will also be required in order to understand parts of the syllabus. As they are studied they should be analyzed critically with respect to their implications for accurate dose delivery in clinical radiation therapy.

Applicability limitations, advantages, & disadvantages of the various devices & techniques should receive particular attention. Candidates should be encouraged to observe & gain practical experience with the equipment & techniques used in radiotherapy in clinical oncology departments.

- 1.3.1 Structure of Matter
- 1.3.2 Nuclear Transformations
- 1.3.3 Production of X-rays
- 1.3.4 Radioactivity
- 1.3.5 Interaction of Radiation with Matter
- 1.3.6 Interaction of particle beam
- 1.3.7 Measurement of Radiation – Radiation quantities and units
- 1.3.8 Radiation detection and measurements
- 1.3.9 Radioisotopes and Radiotherapy Equipments
- 1.3.10 Principles of Radiologic physics, Dosimetry and Treatment Planning
- 1.3.11 Photon External Beam Dosimetry and Treatment Planning
- 1.3.12 Physics, Biology and Dosimetry of Brachytherapy
- 1.3.13 Clinical Applications of Brachytherapy –LDR, HDR and PDR
- 1.3.14 Electron Beam Therapy- Dosimetry, Planning and Techniques
- 1.3.15 Particle Beam Therapy- Dosimetry and Techniques
- 1.3.16 Three Dimensional Conformal Radiation Therapy- Physics, Treatment Planning and Clinical Aspects
- 1.3.17 Intensity Modulated Radiation Treatment, Planning and Clinical Application
- 1.3.18 Particle Beam Radiotherapy: Clinical Perspectives
- 1.3.19 Magna Field Irradiation
- 1.3.20 Intraoperative Radiation Therapy
- 1.3.21 Stereotactic Irradiation
- 1.3.22 Nonsealed Radionuclide Therapy
- 1.3.23 Radioimmunoglobulins in Cancer Therapy
- 1.3.24 Quality Assurance in radiotherapy (QART)
- 1.3.25 Radiation Protection and Regulatory Aspects
- 1.3.26 Errors and correction in radiotherapy delivery
- 1.3.27 Image Guided Radiotherapy (IGRT) and Clinical Aspects
- 1.3.28 Recent Advancements in Radiation Oncology

1.4. Radiobiology

- 1.4.1 The Physics and Chemistry of Radiation Absorption
- 1.4.2 DNA Strand Breaks and Chromosomal Aberrations
- 1.4.3 Cell Survival Curves
- 1.4.4 Radiosensitivity and Cell Age in the Mitotic Cycle
- 1.4.5 Repair of Radiation Damage and the Dose Rate Effect
- 1.4.6 The Oxygen Effect and Reoxygenation
- 1.4.7 Linear Energy Transfer and Relative Biological Effectiveness
- 1.4.8 Acute Effects of Total Body Irradiation
- 1.4.9 Cell Tissue and Tumor Kinetics
- 1.4.10 Predictive Assay
- 1.4.11 Radiation Carcinogenesis
- 1.4.12 Hereditary Effects of Radiation
- 1.4.13 Effects of Radiation on the Embryo and Fetus

1.4.14 Molecular Techniques In Radiobiology

- 1.4.15 Dose Response Relationship for Model Normal Tissues
- 1.4.16 Effect of Radiation on Normal Tissues
- 1.4.17 Time, Dose and Fractionation in Radiotherapy
- 1.4.18 Alternative Radiation Modalities
- 1.4.19 Radioprotectors
- 1.4.20 Radiosensitizers and Bio-reductive Drugs
- 1.4.21 Hyperthermia
- 1.4.22 Immunomodulation of Radiotherapy

1.5 Clinical trials - Statistical basis for planning & interpretation

1.5.1 Clinical Trials

- a) Advantages & disadvantages
- b) Retrospective & Prospective studies
- c) Controlled & uncontrolled trials
- d) Single-blind & double-blind studies
- e) Phase I, II & III trials and meta-analysis
- f) Ethics

1.5.2 Planning a trial

- a) Establishing objectives- short term and long term
- b) Determining the appropriate criteria.
- c) Establishing grounds for inclusion and exclusion of patients
- d) Calculation on sample size
- e) Determining the treatment schedules and any appropriate modifications
- f) Determining the method of allocation of treatments; the allocation ratio and the method and timing of randomization
- g) Determining what measures are to be taken, how they will be taken, who will take them, at what time(s) and where they will be recorded
- h) Designing the appropriate forms of documentation
- i) Determining the proposed duration of the trial, either in terms of a fixed closing date, or the entry of a pre-determined number of patients.
- j) Establishing conditions under which the trial may be terminated earlier than planned & procedures for detecting these conditions.
- k) Re-assessing the proposed trial in terms of ethics, appropriateness to the short & long term objectives, feasibility & the availability of resources.
- l) Writing the protocol
- m) Running a pilot study

1.5.3 Reporting and Publishing a clinical trial

- a) Types of publications
- b) Collating data
- c) Drafting a manuscript
- d) Responding to review
- e) Ethics of publication and plagiarism

2. PRINCIPLE OF ONCOLOGY

2.1 Etiology of Cancer

- a) Genetic predisposition, congenital syndromes
- b) Chromosomal abnormalities, hereditary tumours
- c) Protooncogenes, oncogenes, tumor suppressor genes,
- d) Multifactorial causation
- e) Nutritional aspects in cancer causation and prevention.
- f) Environmental causes of cancer
- g) Biological - protozoal, bacterial, viral
- h) Chemical - Classes of carcinogenic chemicals, smoking
- i) Physical - trauma, irradiation (UV rays, other electromagnetic radiation including X rays and Gamma rays and particulate radiations)
- j) Occupational cancers.

2.2 Epidemiology of Cancer

2.3 Cancer Screening and Prevention

2.4 Cancer Registries & National Cancer Control Programme

2.5 Cancer Chemotherapy

- a) Classification and mode of action of cytotoxic drugs
- b) Pharmacokinetics and Pharmacodynamics
- c) Principles of combinations of therapy, dose response curves, sequential and concomitant chemotherapy, sanctuary sites, high dose chemotherapy, and regional chemotherapy
- d) Standard chemotherapy schedules
- e) Drug administration and Precautions in the safe handling of cytotoxic drugs
- f) Drug Toxicity
- g) Supportive care for chemotherapy
- h) Resistance to Chemotherapy
- i) Basic concepts of Chemotherapy and Irradiation Interaction
- j) Specialised chemotherapy administration techniques

2.6 Cancer Biotherapeutics

- a) Hormonal Therapy
- b) Differentiation Agents
- c) Monoclonal Antibodies
- d) Interferons
- e) Interleukins
- f) Antiangiogenesis Agents
- g) Molecular Targeted Therapy
- h) Vaccines
- i) Gene Therapy
- j) Metronomic therapy

2.7 Imaging in Oncology

- a) Clinical utility of Ultrasound imagers
- b) X ray based imaging modalities in Oncology
- c) MRI and functional imaging in oncology
- d) Biological imaging modalities

2.8 Pharmacogenomics

3. CLINICAL RADIOTHERAPY, CHEMOTHERAPY AND TARGETED THERAPY IN MANAGEMENT OF MALIGNANCIES

3.1 Skin Cancer

3.2 Central Nervous System Tumor/ orbital tumors/Spinal tumors

3.3 Head and Neck Tumors

3.4 Thoracic Tumors

3.5 Breast Tumors

3.6 Gastrointestinal Tumors

3.7 Liver, Gall bladder , bile duct and pancreatic tumors

3.8 Pediatric Tumors

3.9 Gynecologic Tumors

3.10 Male Genitourinary Tumors

3.11 Urinary Tract Tumors

3.12 Endocrine Tumors

3.13 Hematological Malignancies –Leukemias, lymphomas and Plasma cell neoplasm

3.14 Sarcomas of Bone and Soft tissues

3.15 Metastasis of Unknown Origin

3.16 AIDS related Malignancies

3.17 Oncologic Emergencies

3.18 Endocrine aspects of malignancy:- production of hormones by tumors, effect of hormones on tumors, paracrine effects of tumors

3.19 Paraneoplastic syndromes

3.20 Benign Diseases

3.21 Hereditary cancer syndromes

4. OTHER DISCIPLINES ALLIED TO RADIOTHERAPY AND ONCOLOGY

4.1 Surgical Oncology

4.1.1 Basic principles of surgical oncology, biopsy, conservation surgery, radical surgery, palliative surgery

4.1.2 Basics of surgical techniques - head & neck, breast, thorax, abdomen, gynecological, genitourinary, musculoskeletal, CNS

4.1.3 Combined treatments: with radiotherapy, chemotherapy, and hormone therapy

4.2 Rehabilitation

4.3 Complementary alternative medicine

5. PALLIATIVE CARE

- 5.1 Guidelines for palliative care
- 5.2 Symptoms of advanced cancer
- 5.3 Different pharmacologic & non-pharmacologic methods
- 5.4 Pain control, WHO guidelines for adults & children
- 5.5 Palliative radiotherapy
- 5.6 Palliative chemotherapy
- 5.7 Home care
- 5.8 Hospice care
- 5.9 Physical, social, spiritual & other aspects

6. RESEARCH, TRAINING & ADMINISTRATION

6.1 Research in Oncology

- 6.1.1 How to conduct a research
- 6.1.2 Guidelines for biomedical research: Animal studies, drug studies, human trial
- 6.1.3 Cancer clinical trials. Phase I/II, III
- 6.1.4 Ethics of clinical research
- 6.1.5 Evidence based medicine

6.2 Training Programme in Radiotherapy and Oncology

- 6.2.1 Participation in the daily routine work of the department including work rounds of patients admitted for radiotherapy, symptomatic treatment for acute and late radiation reactions, administration of cytotoxic drugs, management of chemotherapy induced side effects and complications, cancer pain management and palliative care.
- 6.2.2 Presentation of cases in the reporting sessions of the department
- 6.2.3 Participation in various procedures and techniques (e.g. Simulation and Treatment Planning; Mould Room Procedures etc.) External Beam Radiotherapy- 2-D & 3- DCRT, IMRT; Brachytherapy- Interstitial, Intracavitary, Intraluminal, Surface;

6.2.4 Active participation in the Tumor Board meetings with other departments for case discussions.

6.2.5 Junior Residents in Radiotherapy must undergo 3 months peripheral postings in other specialities during their 3 years course towards M.D.

6.2.6 Participation in CME-conference, symposium, workshop, seminar

6.2.7 Active participation in teaching and training programme of undergraduate students, allied health students and oncology nurses.

6.3 Administration in Radiotherapy and Oncology

6.3.1 Clinical Oncologist's role as an administrator.

6.3.2 How to set up a Radiotherapy and Oncology department, planning of infrastructure, & equipments

6.3.3 Role in cancer control programme.

6.3.4 Responsibilities towards radiation safety & quality assurance.

6.3.5 Administration aspects of training, academic, patient care & research.

6.3.6 Cancer screening programmes

6.3.7 Cancer Registries

5. TEACHING LEARNING METHODS (including Clinical Study)

Didactic lectures are of least importance; Seminars, Journal clubs, Symposia, Reviews and Guest lectures should get priority for theoretical knowledge.

a) Didactic lectures:

Didactic lectures in Radiation Physics, Radiation Protection and Quality Control

b) Seminars:

There should be a weekly seminar attended by the residents as well as the faculty in which the junior residents present material on assigned topic in rotation. It should be followed by discussion in which all trainees are supposed to participate.

c) Case conference:

A case conference should be held every week where a junior resident prepares and presents a case of academic interest by rotation and it is attended by all the members of the department.

d) Journal club:

Journal club is held every week in which a junior resident presents a critical evaluation of a research paper from a journal.

e) Research Forum:

There should be a monthly meeting of one hour each in which the residents present their plan of research as well as the report of the completed work of their projects to the faculty, resident and non-medical professionals who make critical comments and suggestions.

f) Case presentations:

New inpatient and outpatient cases should be routinely worked up in detail by the residents and discussed with the consultant. They are also encouraged to bring their follow up patients to the consultant for presentation and discussion. In addition, the residents are required to present case material at ward rounds.

g) Attendance at Multi-Disciplinary tumor board Team Meetings as applicable

h) Clinical audits including radiation chart audits

6. STRUCTURED TRAINING PROGRAMME

Posting Schedule Total Duration: 3 years

First Year (In Rotation)	Second Year (In Rotation)	Third Year (In Rotation)
Ward Posting –Monthly	OPD Posting – Monthly	OPD Posting – Monthly
OPD Posting- Monthly	Ward Posting – Monthly	Ward Posting – Monthly
	Simulator Planning – Monthly	Simulator Planning- Monthly
Conventional RT planning	Conventional and conformal RT planning Brachytherapy- Monthly	Brachytherapy- Monthly
	Special RT procedures- TBI/SRT/SRS observation	
Tumor Board Meetings	Tumor Board Meetings	Tumor Board Meetings

Conduct of regular weekly treatment review clinics should be done.
Interdepartmental meeting participation should be part of training.

Peripheral Postings

- | | |
|-----------------------|------------|
| 1.Surgical Oncology | - 1 month |
| 2.Medical Oncology | - 1 month |
| 3.E.N.T. | - 15 days. |
| 4.Radiology | - 15 days |
| 5.IMRT/3DCRT Training | - 1 month. |

During IInd year, the Students are encouraged to undergo special postings for learning new advanced techniques / procedure / skills in institutions of higher repute where the requisite facilities are available without affecting the duties of the parent department.

7. Evaluation of the candidates in both theory and practical aspects will help the candidate in improvement of his/her knowledge, skills and attitude.

8. COMPETENCY ASSESSMENT:

- **OVERALL:**

- a) Communication / commitment / Contribution / Compassion towards patients and Innovation () - 5 Marks
- b) Implementation of newly learnt techniques/skills ()

- Number of cases presented in Clinical Meetings/ Journal clubs/seminars - 5 marks

- Number of Posters/Papers presented in Conferences/ Publications and Research Projects - 5 marks

- No. of Medals / Certificates won in the conference / Quiz competitions and other academic meetings with details. - 5 marks

Total 20 Marks

PG CLINICAL COURSES

- VIVA including Competency Assessment - 80 Marks (60 + 20)
- Log Book - 20 marks

ASSESSMENT SCHEDULE IS AS FOLLOWS

Year of study	Period				Total Max.20 marks
I year	Upto Dec	10 marks	Upto June	10 marks	20 Marks
II year	Upto Dec	10 marks	Upto June	10 marks	20 Marks
III year	Upto Oct	10 marks	Upto Feb	10 marks	20 Marks
	AVERAGE				20 Marks

Log book is included in the formative assessment.

9. DISSERTATION AND UNIVERSITY JOURNAL OF MEDICAL SCIENCES:

As per the 49th SAB Resolution under Point No. 2 and in the 52nd SAB it was reiterated regarding the topic for dissertation

The topic for the dissertation should be registered and sent to the University after Ethics Committee approval before 31st of December of the first Post Graduate Year. Only one change of topic with proper justification from the Head of the Department is permitted before 31st March of the first Post Graduate Year. The change of dissertation title will not be permitted after 31st March of the First Post Graduate Year. This modification in regulation will be scrupulously followed from the academic year 2015-16 admission onwards.

As per MCI Clause 14 (4)(a), thesis shall be submitted atleast 6 Months before the Theory and Clinical/Practical Examination.

A candidate shall be allowed to appear for the Theory and Practical/Clinical Examination only after the acceptance of the Thesis by the Examiners.

The periodical evaluation of dissertation/log book should be done by the guide / HOD once in every six months. The HOD should ensure about the submission of dissertation within the stipulated time.

Regarding submission of articles to the University Journal of Medical Sciences for all the PG Degree/Diploma courses, it is mandatory that the students have to submit at-least one research paper. Case Reports are not considered as Research Paper

10. THEORY EXAMINATION:

Paper I- Basic principles in practice of Radiotherapy (Radiation Physics, Radiobiology, Equipments and Techniques of Radiotherapy)

Paper II- Clinical Radiation Oncology

Paper III- Allied Oncology Practices(Surgical Oncology, Medical Oncology and Palliative Care)

Paper IV- Recent Developments in Oncology Cancer Control Programmes, Research methodologies in Oncology

Question Paper pattern: PAPER I, II, III & IV

Elaborate on 2 x 15 = 30

Write Notes on 10 x 7 = 70

Total 100 marks

11. PRACTICAL EXAMINATION

REFERENCE- 218th GC dt 28.03.2013

MD RADIOTHERAPY

CLINICALS

LONG CASE - (1 X 100 MARKS)	100 MARKS
SHORT CASE - (2 X 25 MARKS EACH)	50 MARKS
PRACTICALS – RADIOTHERAPY PLANNING	25 MARKS
OSCE (5 marks x 5 stations)	25 MARKS
TOTAL	200 MARKS (A)
VIVA VOCE	80 MARKS (B)
LOG BOOK	20 MARKS (C)
AGGREGATE (CLINICAL + VIVA) TOTAL	300 MARKS (A+B+C)
MINIMUM REQUIRED FOR PASS (50%)	150 MARKS
DISSERTATION	APPROVED / NOT
	APPROVED

12. LOG BOOK

The post graduate students shall maintain a record(log)book of the work carried out by them and the training program undergone during the period of training.

Interdepartmental weekly meeting with radio diagnosis is a must and entries must be made in the log book.

Periodic review of Log book and Dissertation have to be done in the Department by guide/HOD once in every 6 months.

Following details will be entered:

1. Treatment planning and procedures performed
2. Presentation in departmental seminars
3. Cases presented in clinical meetings
4. Presentations in journal clubs along with Title, Journal & Issue.
5. Schedule of intradepartmental rotation
6. Details of peripheral postings
7. Conferences attended – National/International
8. Posters presented in the conference
9. Papers presented at conferences with title name of the conference, date of presentation
10. Paper published with title, name & issue of the journal

11. Physics Practical

- a. Output measurement
- b. Determination of optical and radiation field congruence
- c. Determination of % depth dose for cobalt beam
- d. Verification of inverse square law
- e. Quality Assurance in Radiotherapy

13. VIVA including Competency Assessment

VIVA including Competency Assessment

- 80 Marks (60 + 20)

Prevention, Screening, Clinical trials, Radiation protection, Cancer Registry, National Cancer Control Programme, Oncological emergencies, Benign disease and RT, Paediatric malignancies, Recent advances.

14. OSCE

1. Pathological specimens /Histopathology slides
2. X-ray films, CT and MR Images
3. Isodose charts
4. Cases
5. Medical Physics Instruments and Brachytherapy Applicators
6. Chemotherapeutic agents
7. Dosimetry and QA reports
8. Plan evaluation reports / Colour wash / DVH
Spotters- Identification and Description

15. REFERENCE BOOKS

SUGGESTED BOOKS AND AUTHORS

1. Principle & Practice of Radiation Oncology Carlos Perez 6th Edn, 2013 Halperin
2. Cancer (2 Volumes) Devita 10th Edn, 2012 LWW
3. ACS Textbook of Clinical Oncology Murphy 2nd Edn
4. The Physics of Radiation Therapy Faiz M Khan
5. Radiobiology For The Radiologist Eric J. Hall 6th Edn LWW
6. AJCC Cancer Staging Handbook, American Cancer Society, 7th Edn, 2010 Springer Verlag
7. The Physics of Radiology H.E.Johns 4th Charle.C.Thomas
8. The Physics of Modern Brachytherapy in Oncology Baltas 1st Edn, 2007 Taylor & Fracis
9. Clinical Oncology Abeloff 3rd Edn, 2004 Elsevier
10. Practical Essentials of Intensity Modulated Radiation Therapy Chao 2nd Edn, 2005 LWW
11. Textbook of Radiation Oncology Principles and Practice G. K. Rath 2nd Edn Elsevier
12. Radiation Therapy Planning Bentel Gunilla C McGraw-Hil
13. Clinical Radiation Oncology Gunderson 2nd Edn, 2007 Elsevier
14. Principles and Practice of Radiation Therapy: Introduction to Radiation Therapy C. Washington 2nd Edn Elsevier
15. Intensity modulated radiation therapy: a clinical perspective Arno J. Mundt PMPH-USA
16. Handbook of Evidence-based Radiation Oncology Eric K. Hansen
17. Fundamental Physics of Radiology Meredith & Massey
18. The Manual of Clinical Oncology Casciato 5th Edn.2004 LWW
19. Clinical Target Volumes in Conformal and Intensity Modulated Radiation Therapy V. Gregorie
20. Textbook of Radiation Oncology L. Phillips Elsevier
21. Bethdsa Hand Book of Clinical Oncology Abraham 2nd Edn, 2005 LWW
22. Treatment Planning in Radiation Oncology Faiz M Khan 2nd Edn, 2007 LWW
23. Diagnostic and Surgical Imaging Anatomy H.RicHarnsberger 1st Edn, 2006 LWW
24. Cancer- Diagnosis and Management Ackermann
25. Text Book of Radiotherapy G. Fletcher
26. Surface and Radiological Anatomy A. Halim
27. Essentials of Surface and Radiological Anatomy V. Kapur
28. Handbook of Radiation Oncology: Basic Principles and Clinical Protocols Bruce Haffty

**** Note : The editions are as applicable and the latest editions shall be the part of the syllabi.**

16. JOURNALS

SUGGESTED JOURNALS

1. Annals of Oncology
2. British Journal of Cancer
3. Cancer Wiley
4. Cancer Genetics and Cytogenetics Elsevier
5. Clinical Oncology (R Coll Radiol) Elsevier
6. European Journal of Cancer Elsevier
7. Gynecologic Oncology
8. Journal of cancer research and therapeutics Medknow
9. Journal of medical physics Medknow
10. Indian Journal of Cancer Indian J Cancer
11. International Journal of Cancer Int J Cancer Wiley
12. International Journal of Clinical Oncology Springer-Verlag
13. International Journal of Gynecological Cancer Blackwell
14. International Journal of Oncology
15. International Journal of Radiation Oncology, Biology, and Physics Elsevier
16. Journal of Cancer Research and Clinical Oncology Springer-Verlag
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