SHRI GURU RAM RAI UNIVERSITY DEHRADUN (UTTARAKHAND)

REGULATIONS OF THE UNIVERSITY FOR THE AWARD OF THE DEGREE OF BACHELOR OF SCIENCE ON MEDICAL RADIO & IMAGING TECHNOLOGY

In exercise of the powers conferred by section of the SGRR University Act no.3 of 2017.Academic Council of the Shri Guru Ram Rai University Dehradun hereby makes the following regulations:-

SHORT TITLE AND COMMENCEMENT

(1) These regulations shall be called "THE REGULATIONS FOR THE BACHELOR OF SCIENCE IN MEDICAL RADIO & IMAGING TECHNOLOGY OF THE SHRI GURU RAM RAI UNIVERSITY, DEHRADUN".

(2) They shall come into force from the 2017-2018 academic sessions.

(3) The regulations framed are subject to modification from time to time by the sending them to the Academic Board of the University.

ADMISSION, SELECTION, MIGRATION AND TRAINING

ADMISSION TO THE B.Sc, MEDICAL RADIO & IMAGING TECHNOLOGY COURSE.

'ELIGIBILITY CRITERIA'

No Candidate shall be allowed to be admitted to the B.Sc Medical Radio Imaging Technology (MRIT) until:-

1) He/She has completed the age of 17 years on or before first day of July of the year commencing the prescribed academic session of the said course;
2) He/She has passed qualifying examination as under:

a) The Indian school Certificate Examination which is equivalent to 10+2 Higher Secondary Examination after a period of 12 years study, the last two years study comprising of Physics, Chemistry, Biology or Mathematics or any other elective subject with English at a level not less than the core course for English as prescribed by the National Council for Educational Research and training after the introduction of the introduction of the 10+2+3 years educational structure as recommended by the National Committee on education;

OR

b) The Intermediate examination in science of an Indian University/Board or other recognized examing body with Physics, Chemistry, Biology /Maths which shall include a practical test in these subjects and also English as a compulsory subject.

OR

c) The pre-professional or medical examination with Physics, Chemistry and Biology after passing either the higher Secondary school examination, or the pre-university or an equivalent examination. The pre-professional/pre-medical examination shall include a practical test in physics, Chemistry and Biology/and also English as a compulsory subject.

OR

d) The first year of the three years degree course of recognized University, with Physics, Chemistry and Biology/ including a practical test in these subject provided the examination is a 'University Examination' and candidate has passed 10+2 with English at al level not less than a core course;

OR

e) B.Sc examination of an Indian University, provided that he/she has passed the B.Sc examination with not less than two of the following subjects-Physics, Chemistry (Botany, Zoology) and further that he/she has passed the earlier qualifying examination with the following subjects Physics, Chemistry/Biology and English (10+2 level);

OR

f) Any other examination which in scope and standard is found to be equivalent to the intermediate science examination of an Indian University/Board, taking Physics, Chemistry and Biology including a practical test in each of these subjects and English.

OR

10+2 with vocational training in Radiology/ Medical Microbiology/MLT/Diploma in Radiology/ Diploma in MLT are also eligible.

MIGRATION/TRANSFER OF CANDIDATE

a) Migration/ Transfer of candidate from one recognized institution to another institution of this University or from another University will not generally be considered.

b) However, under extra ordinary circumstances, the Vice –Chancellor shall have the power to place any migration/ transfer he deems fit I the Governing Council and get its approval for grant of permission for migration/ transfer to candidates to candidates undergoing course of study in affiliated institutes of this university.

TRAINING PERIOD AND TIME DISTRIBUTION

1) The course of BMRIT shall be Three and a Half academic years including 6 months compulsory internship. The practical training should be in a150 bedded hospital with minimum patients occupancy of 75%. A part from practical training in non-clinical subjects, the students shall also undergo practical training in the said hospital equipped with X-rays, Ultra Sound & CT Scan in Deptt. of Radiology of the said hospital.

2) The period of Three & a Half years is divide into phase as follows:-

(a) Phase 1 First year B.Sc Medical Radio & Imaging Technology (MRIT) (One Year duration)

i)	Human Anatomy	**MRT-101**
ii)	Human Physiology	**MRT-102**
iii)	Preventive Medicine and Health care & protection against radio hazards	**MRT-103**
iv)	Basic & Radio Physics	**MRT-104**
v)	Basic Orientation of Radiotherapy & Radiology Imaging	**MRT-105**

(b) Phase II- Second Year B.Sc Medical Radio & Imaging Technology (MRIT) (One Year duration)

I. Orientation in Paraclinical Science. **MRT-201**

II. Radiation Physics Including Radiation Protection. **MRT-202**

III. Basic Radiographic Techniques. **MRT-203**

IV. Equipments for Radiotherapy including newer development **MRT-204**

V. Regional Radiography & Radiological Procedures. **MRT-205**

(c) Phase III- Third Year B.Sc Medical Radio Imaging Technology (One Year Duration)

I. Orientation in Clinical Sciences. **MRT-301**

II. Radiotherapy Planning & Quality Control in radiation Therapy. **MRT-302**

III. Equipments for Radio diagnosis ultrasonology & CT Scanning Including newer developments and quality control. **MRT-303**

IV. Special Techniques for Ultrasound & CT Scan Including Special Procedure. **MRT-304**

V. Radiation Therapy & Brachy Therapy Techniques in Malignant & Non Malignant Diseases. **MRT-305**

(d) Phase IV Six –months compulsory internship in a 150 bedded indoor hospital.

Compartments / Supplementary/ Back Paper:

(I) A student who obtain 40% of the marks individually but has failed in two papers shall be permitted to appear in those papers only at the two consecutive examination and if he/she passes at either of those examination he/she will be deemed to have passed the examination and will be promoted to higher class. (Aggregate marks should be 50%).

(II) A student (s) appearing in back paper/ supplementary shall be eligible to join the next higher Class provisionally however any student who fails to pass Ist year would not be admitted in 3rd year course.

There shall be one main examination in a year and a supplementary to be held not less than 6 months after publication of its results.

Theory Examination: All the papers in each year carrying 100 marks out of which 30 marks will be internal assessment and 70 marks for external assessment based on the question paper sent by the University the paper will be 3 hrs. Each paper will have 8 questions out of which the candidate will have to attempt 5 questions.

The practical examination will be held with the Final Examination. The practical and Viva voice in each subject will carry 30% marks as internal & 70% marks as external assessment (according to examination scheme) prescribed for the year.

PHASE DISTRIBUTION AND TIMING OF EXAMINATION:

1. Ist Annual Examination at the end of Ist year.
2. 2nd Annual Examination at the end of 2nd year.
3. 3rd Annual Examination at the end of 3rd year.
4. Six months Internship after third Annual Examination.

EXAMINATION REGULATIONS

Essentialities for qualifying to appear in professional examinations. The performance in essential components of training to be assessed based on.

ATTENDANCE: 75% of attendance in a subject for appearing in the examination is compulsory provided he/she has 80% attendance in non-lecture teaching i.e. seminars group discussions. Practical in Hospital postings and bedside clinics of 150 bedded indoor hospital with at least 75% patient Occupancy.

INTERNAL ASSESSMENT:

(a) It shall be based on day today assessment (see note), evaluation of student assignment, preparation for seminar. Clinical case presentation etc.

(b) Sessional examinations shall be conducted throughout the course. The question of number of examinations is left to the institutions;

(c) Day to day records should be given importance during internal assessment.

(d) Weightage for the internal assessment shall be 20% marks of the total marks fixed for internal.

(e) Student must secure at least 50% marks of the total marks fixed for internal Assessment in Particular subject in order to eligible to appear in final university examination of the subject.

Note: Internal Assessment shall being different ways in which students participation in learning process is evaluated. Some examples are as follows-

(i) Preparation of subject for student's seminar.
(ii) Preparation of a clinical case for discussion.
(iii) Clinical case study problem solving exercise.
(iv) Participation in projects for health care in the community.
(v) Proficiency in carrying out a practical or a skill in small research project.
(vi) Multiple choice questions (MCQ) test after completion of a system/ teaching. Each item tested shall be objectively assessed and recorded. Some of the items can be assigned as home work'/Vacation work.

UNIVERSITY EXAMINATIONS:

Theory Papers will be prepared by examiners as prescribed. Nature of question will be short answer type / objective type and marks for each part indicated separately. Practical/ clinical will be conducted in the laboratories or hospital wards. Objective will be to assess proficiency in skills Conduct of experiment, interpretation of date and logical conclusion. Clinical cases should preferably include common diseases not esoteric syndromes or rare disorders. Emphasis should be on candidate's capability in eliciting physical signs and their interpretation.

Viva/ oral includes evaluation of management approach and handling of emergencies Candidate's skills interpretation of common investigative data also is to be evaluated.

The examinations are to be designed with a view to ascertain whether the candidate has acquired the necessary for knowledge, skills along with clear concepts of the fundamentals, which are necessary for him to carry out his

professional day to day work competently. Evaluation will be carried out on an objective basis and practical Question papers should preferably be of short structure/objective type.

Clinical cases/ practical shall take into account common diseases, which the student is likely to come in contact in practice.
During evaluation (both external and internal) it shall be ascertained if the candidate has acquired the skills.-

There shall be one main examination in a year and a supplementary to be held not less than 6 months after publication of its results.

Note: Result of all University Examinations shall be decided before the start of teaching for next session.

DURATION OF EXAMINATION & QUESTIONS

(i) Each written paper will be attempted.
(ii) A clinical / practical examination in any subject for student shall not be for more than a day.

GENERAL

If Candidate obtains an aggregate of 75% in all the subjects of any professional Examination, he will be declared to have passed that Examination with Honors, provided he/she passes in all subjects in the first attempt.

INTERNSHIP

General

Internship is a phase of training wherein a graduate is expected to conduct actual practice of Medical Radio Imaging & Technology and acquired skills under supervision so that he/she may become capable of functioning independently.

SPECIFIC OBJECTIVES

At the end of internship training the graduate shall be able to:

(i) Perform all the diagnostic techniques.

(ii) Use discretely the essential diagnostic services.

(iii) Manage all type of clinical diagnostic methods.

(iv) Demonstrate skills in handling the modern equipment in Medical Radio Imaging & Technology.

(v) Develop leadership qualities to function effectively as a reader of the Laboratory environment.

(vi) Render service of the Laboratory setup and to communicate effectively with the Doctors and the hospital management.

INTERNSHIP TIME DISTRIBUTION

Main Objective

Development of skills and competency in data processing, reporting and maintenance of records, Laboratory investigations.

Total Period of Internship: 6 Months

OTHER DETAILS

(1) All parts of internship shall be at least 150-bedded hospital & minimum patient occupancy in 75%.

(2) Every candidate will be required after passing the final B.Sc Medical Radio Imaging Technology, Examination to undergo compulsory rotatory internship to the satisfaction of the college Authorities and University

concerned for a period of 6 months so as to be eligible for the award of the degree of Bachelor of Science in Medical Radio & Imaging Technology.

(3) The University shall issue a provisional B.Sc Pass Certificate on passing the final examination after the internship completion on demand by the candidate.

(4) The intern shall be entrusted with Laboratory responsibilities under direct Supervision of Senior Post graduate Radiologist & Ultrasonologist. They shall not be working independently.

(5) Interns will not issue certified reports or other related documents under their signature.

ASSESSMENT OF INTERNSHIP

(1) The interns maintain the record of work, which is to be verified and certified by the Post graduate Radiologist & Ultrasonologist under whom he/she works. Apart from scrutiny of the record of work, assessment and evaluation of training shall be undertaken by an objective approach using situation test in knowledge, skills and attitude during and at the end of training. Based on the record of work and date of evaluation the Director / Principal shall issue 'Certificate of Satisfactory Completion" of training following which the University shall award the B.Sc (MRIT) Degree and declare the candidate eligible for the same.

(2) Satisfactory completion shall be determined on the basis of the following:

(a) Proficiency of knowledge required for each Diagnostic Techniques

(b) The competency in skills expected to manage each Diagnostic Technique.
- Competency for performance of self –performance
- Of having assisted in procedures
- Of having observed.

(c) Responsibility, Punctuality, workup Diagnostic Techniques, involvement in procedures, follows of report.

(d) Capacity to work in a team (behavior with colleagues, nursing staff and relationship with Medical and Para medicals.

(e) Initiating, participation in discussions, research aptitude.

MEDIUM OF INSTRUCTION

English shall be the Medium of Instructions for all the subject of study and for examinations of Bachelor of Medical Radio Imaging Technology course.

WORKING DAYS IN AN ACADEMIC YEAR

Each Academic year shall spread over a period of not less than 180 working days.

CONDITION OF LACK OF ATTENDANCE

As per the existing rules and regulations of SGRR University, Dehradun

SUBMISSION OF RECORD NOTE BOOKS

At the time of practical examination, each candidate shall submit to the examination the record notebooks duly certified by the Head of the College as a bonafide record of work done by the candidate.

CLASSIFICATION OF SUCCESSFUL CANDIDATE

REVALUATION OF ANSWER PAPAERS

The regulations as prescribed by the University for other Undergraduate Course shall be applicable.

WARD OF MEDALS AND PRIZES

The University shall award at its convocation medals and prizes to outstanding candidates, as and when instituted by the donors as per the schedule as per the prescribed for the award.

UNIVERSITY RANKING

First, Second and third University ranks may be awarded to candidates, who have passed all the examination in the first appearance and taking into consideration the aggregate marks obtained in all the subjects in which the candidate had been examined during the entire course of study.

DISTRIBUTION OF PAPERS & MARKS IN VARIOUS YEARS

IST YEAR

Course Code	Course title	Marks for Theory			Marks for Practical			Total Marks
		IA*	EE*	Total	IA*	EE*	Total	
MRT 101	Human Anatomy	30	70	100	30	70	100	200
MRT 102	Human Physiology	30	70	100	30	70	100	200
MRT 103	Preventive Medicine and Health Care & Protection against Radio hazards	30	70	100	-	-	-	100
MRT 104	Basic & Radiation Physics	30	70	100	-	-	-	100
MRT 105	Basic Orientation of Radiotherapy & Radiology Imaging	30	70	100	30	70	100	200
	TOTAL	**150**	**350**	**500**	**90**	**210**	**300**	**800**

IIND YEAR

Course Code	Course title	Marks for Theory			Marks for Practical			Total Marks
		IA*	EE*	Total	IA*	EE*	Total	
MRT 201	Orientation in Paraclinical Sciences	30	70	100	-	-	-	100
MRT 302	Radiation Physics including radiation Protection	30	70	100	-	-	-	100
MRT 303	Basic Radiographic Techniques	30	70	100	30	70	100	200
MRT 304	Equipments for Radiotherapy including new developments	30	70	100	30	70	100	200
MRT 305	Regional Radiography & Radiological Procedure	30	70	100	30	70	100	200
	TOTAL	**150**	**350**	**500**	**90**	**210**	**300**	**800**

III[RD] YEAR

Course code	Course title	Marks for Theory			Marks for Practical			Total Marks
		IA*	EE*	Total	IA*	EE*	Total	
MRT-301	Orientation in Clinical Sciences	30	70	100	-	-	-	100
MRT-302	Radiography Planning & Quality Control & radiation therapy	30	70	100	30	70	100	200
MRT-303	Equipments for Radio diagnosis Ultrasonology & CT Scanning including newer developments and quality control	30	70	100	30	70	100	200
MRT-304	Special Techniques for Ultrasound & CT Scan Including Special Procedure	30	70	100	-	-	-	100
MRT-305	Radiation Therapy and Brachy therapy techniques in Malignanat & Non Diseases	30	70	100	30	70	100	200
	TOTAL	**150**	**350**	**500**	**90**	**210**	**300**	**800**

Note:

1. The minimum pass marks will be 40% in individual subjects in theory and Practical and 50% in aggregate.

2. The Theory and Practical papers will be of equal weightage with 30% in Sessional and 70% in final University Examination.

3. The division will be determined on the basis of the aggregate of the marks of all the courses./subjects prescribed for the degree as under:

   a) Passed with honors will be rewarded on 75% and above only in first attempt.

   b) First Division will be marked on 60% and above.

   c) Second Division will be marked on 50% and above but less than 60%.

BACHELOR OF MEDICAL RADIO IMAGING TECHNOLOGY
(B.M.R.I.T IST YEAR)
PAPER IST HUMAN ANATOMY

UNIT-I

Introduction- Scope of Anatomy. Organization of Tissue.

Organs and systems.

Anatomical position of the body.

Axis and planes.

Bones- Classification development, parts of long bones and blood supply of bones.

Joints- Definition, classification, movements of different joint.

UNIT-II

UPPER EXTREMITY

Osteology- Clavicle, scapula, Humerus, Radius, ulna, carpals, metacarpals and Phalanges

Soft tissue- (Only Outline)

Breast, pectoral region, axilla, front & back of arm, front of forearm, back of forearm, Palm, dorsum aspect of Hand.

Joints- Shoulder girdle, Shoulder joint, elbow joint, radio-ulnar joint, wrist joint and joints of hand.

Surface measuring and Radiological Anatomy of upper limb.

UNIT –III

LOWER EXTREMITY

Osteology- Hipbone, Femur, Tibia, Fibula, Patella, Tarsals, Metarsals and Phalanges.

Soft tissue parts: Only outline.

Glutela region, front and back of the thigh (femoral triangle, femoral canal and inguinal canal) medial side of the thigh (adductor canal). Lateral side of the thigh, popliteal fossa, Anterior and posterior compartment of leg, sole of the foot.

Joints- Hip joint, knee joint, ankle joints of the foot.

Surface Anatomy and Radiological Anatomy of Lower Limb.

UNIT-IV

TRUNK

a) Osteology- Vertebra and ribs, sternum.

b) Soft tissue- Vertebral muscles & intercostals muscles

c) Joints- Costochondral, Costo vertebral, Intervertebral Joints.

HEAD AND NECK

a) **–**

b) Osteology- Mandible and bones of skull.

c) Joints- Temporomandibular Joints.

Surface and Radiological Anatomy of the Head & Neck.

UNIT –V

THORAX

a) Pleura
b) Lungs
c) Mediastinum
d) Pericardium
e) Heart
f) Trachea
g) Oesophagus

Surface measuring and Radiological Anatomy of Thorax.

UNIT- VI

ABDOMEN

Soft Tissue- Only Outline

a) Abdominal cavity & Peritoneum
b) Stomach
c) Intestine
d) Spleen
e) Pancreas
f) Liver & Gall Bladder
g) Kidney & Ureter, Urinary Bladder & Urethra
h) Diaphgram
i) Male & Female reproductive organs.
j) Rectum & Anal Canal.

II- Surface measuring and Radiological Procedure Used in the study of Abdominal Organs.

NEURO ANATOMY

a) Meninges & C.S.F.

b) Sulcuss & Gyrus and various areas of Cerebral Hemispheres.

c) Thalamus, Hypothalamus and basal Ganglia.

d) Cerebellum.

e) Pons Medulla.

f) Spinal Cord.

g) IIIrd, IVth & Lateral Ventricles.

h) Blood Supply of Spinal Cord & Brain.

Surface and Radiological Anatomy of Brain.

PRACTICALS

a) Surface measuring

b) Ostiology.

c) Identification of Anatomical structures with help of models, charts, CD Rom etc**.**

BACHELOR OF MEDICAL RADIO IMAGING TECHNOLOGY
(B.M.R.I.T IST YEAR)
PAPER IIND HUMAN PHYSIOLOGY

UNIT-I

PHYSIOLOGY OF BLOOD AND CVS

a) Composition of Blood

b) Function of RBC WBC

c) BLOOD groups

d) Circulation-General Principles

e) Cardiac cycle and output

f) E.C.G.

UNIT-II

RESPIRATORY SYSTEM

a) Mechanism of respiration- internal and external.

b) Capacity and lung volumes.

DIGESTIVE SYSTEM

a) Introduction to digestive system, Alimentary functional anatomy

b) The Salivary glands

c) The stomach and its secretion

d) Intestine & its secretion

e) Function of liver

UNIT-III

ENDOCRINAL SYSTEM

General Principle of endocrinology

Thyroid

Parathyroid

SKIN

Structure & function of Skin.

UROGENITAL SYSTEM

a) Physiology of Kidney and Urine formation

b) Constituent of normal urine etc.

c) Kidney function tests

d) Physiology of Male and Female reproductive system.

UNIT-IV

a) Reflex are.

b) Physiology of the central nervous system.

c) Physiology of the sympathetic and Parasympathetic nervous system.

d) Function of Cerebrum, Cerebellum, basal ganglia, thalamus

e) Hypothalamus, CSF and Blood brain barrier.

Practicals

TLC
DLC
RBC

Blood Pressure

Reflexes- Superficial & Deep

Test for functions of cerebrum

Test for function of cerebellum

BACHELOR OF MEDICAL RADIO IMAGING TECHNOLOGY
(B.M.R.I.T IST YEAR)
PAPER IIIRD PREVENTIVE MEDICINE AND HEALTH CARE & PROTECTION AGAINST RADIOLOGICAL HAZARDS

UNIT-I

Water, air, and noise Pollution: Removal of water hardness, purification of water and standards of water quality. Air and Pollution and their prevention. Housing and air conditioning.

Hygiene and sanitation: Sanitation barriers, excreta disposal and disposal of hospital waste. Incineration and disinfection.

Infections and control: Microbial Pathogenecity, source and spread of infection in community, pathogenesis, toxigenicity, invasiveness, variations and virulence, host factors controlling infections to men, mode of spread and their control by physical & chemical agents.

UNIT-II

Epidemiology: Epidemiology, surveillance and control of community infections. Role of laboratory in community and hospital infections. Emergence of drugs resistance. Methods of prevention and control-Isolation of patients, quarantine and incubation periods of various infectious diseases. Management of patients infectious disease hospital (IDH).

Prophylactic immunization: Rationale of immunization, immune response and duration of immunity, controlled studies of prophylactic Vaccines and hazards immunization. Various national immunization programs and vaccine schedule.

Reproductive, Family Planning & Child Health Care Programs.

UNIT- III

1. Health care by balance diet and yoga: Normal constituents of diet, various diet programs, balanced diet and factors responsible for etiology of various nutritional disorders. Carcinogens in food, Role of regular exercise and yoga in prevention and management of various diseases.

2. Health Planning and Management: Health planning, Planning cycle, malaria eradication and various other national health policy and programs.

UNIT-IV

Protection against Radio hazards

- General Principles & materials
- Departmental Protection
- Protection instruments & personnel monitoring.

BACHELOR OF MEDICAL RADIO IMAGING TECHNOLOGY
(B.M.R.I.T IST YEAR)
PAPER IVTH BASIC RADIATION PHYSICS

UNIT-I

Fundamental of Physics

Matter & Energy

Radiation & Spectra

Atoms & nuclei

Radioactivity

Electricity and Magnetism

UNIT-II

Production

Properties

Measurement

Interaction of X-Rays-Gamma rays and electron radiation with matter and principles of different absorption in biological materials.

UNIT-III

Control & Indicating devices

Roent gen & its measurements

Geiger-Muller & scintillation counters & Dosimeter

Absorbed does & RAD

Filter & Filtration.

BACHELOR OF MEDICAL RADIO IMAGING TECHNOLOGY (B.M.R.I.T IST YEAR)

PAPER VTH BASIC ORIENTATION OF RADIOGRAPHY & RADIOLOGY IMAGING

UNIT-I

1. The X-Ray machine.
2. X-Ray Production, Emission & Interactions with Matter.

UNIT-II

1. Radiographic Film, Latent Image, Intensifying Screens, Grids.
2. Radiographic Exposure, Film Developing & Processing, Radiographic Quality.

UNIT-III

Physical Principles of Diagnostic Ultrasound Piezoelectric effect, Acoustic Intensity, Reflection, Impedance & Absorption.

Ultra Sound Transducer, Beam Operational Modes & Biological effects.

UNIT-IV

Compound Topography: Principles of operation System Components & Image Reconstruction

Physical Principles of Magnetic Resonance Imaging: Basic Concept, system Components, Biological Hazards, Advantage over CT.

PRACTICAL BASED ON THEORY

BACHELOR OF MEDICAL RADIO IMAGING TECHNOLOGY
(B.M.R.I.T IIND Year)
PAPER IST ORIENTATION IN PARACLINICAL SCIENCES

UNIT-I

PARASITOLOGY

Entamoeba Histolytica

Leishmania

Material Parasites of Man

Helminthology

Taenia Saginata

Taenia Soleum

Echinococcus Granulosvs

Ascaris Lumbricoides

Ancylostoma Duodenale

Strongylids Stercoralis

UNIT-II

MICROBIOLOGY

Morphology & physiology of Bacteria

Staphylococcus

Streptococcus

Mycobacterium Tuberculosis

Spirochetes

Corneybacterium Diptheria

UNIT-III

VIRUS

General Properties

Herpes Virus

Poliovirus

Hepatitis Virus

Oncogenic Virus

HIV

UNIT-IV

PATHOLOGY

Inflammation

Osteomyelitis

Fractures

Osteoporosis

Rickets

Osteomalacia

Tumors of Bone

Rhematoid Arthiritis

Gout

Osteoarthritis

UNIT-V

PHARMACOLOGY

Pharmacokinetics of Drugs

- Absorption
- Distribution
- Metabolism
- Excretion

Adverse drugs, reaction & Management

Pharmacology of different dyes used in Radiological Procedures.

BACHELOR OF MEDICAL RADIO IMAGING TECHNOLOGY
(B.M.R.I.T IINd Year)
PAPER IIND RADIATION PHYSICS INCLUDING RADIATION PROTECTION

Atomic structure as applied to generation of X-Rays and radioactivity spectrum of diagnostic imaging and therapy X-Rays Effects of variation of tube voltage, current, filtration, III waveform and target material on X-Ray Production. Laws of radioactivity and decay schemes of different alpha, Beta, Gama ray, Artificial radio nuclide generators employed in medicine in general and radiotherapy sources in particulars, Interaction of radiation with matter attenuation absorption and scattering phenomena, Photoelectric absorption, Compton scattering, pair production and annihilation process, ionization effects of geometry absorber and on radiation quality. Transmission of x-ray through body tissues, Linear energy transfer. Range of secondary electrons and electron build up relative amounts of scatter from homogeneous and heterogeneous beam during the cones, diaphragm, collimaters etc, units of radiation measurements specification of quality and half-valve thickness (HVT) and its measurements, filters and filtration Measurement of radiation and dosimeteric procedures. Radiation detectors and their principles of working. Definitions of Bragg-Peak, Percentage depth dose, Peak scatter, factor, tissue air-ratio, tissue maximum ratio, scaller air wedge angle, hinge angle, compensators, beams flattering filters, scottering foils. Physical properties of phantoms, phantom materials, bolus and bolus substitutes. Factors used for treatment dose calculations, Daily treatment time and monitor units calculation method Physical aspects of electron and neutron therapy.

BACHELOR OF MEDICAL RADIO IMAGING TECHNOLOGY
(B.M.R.I.T IINd Year)
PAPER IIIRD BASIC RADIOGRAPHIC TECHNIQUES

Skull: Radiography of cranial bones, cranium, sella, turcica, Orbit, optieformina, superior orbital fissure and inferior orbital fissure.

Facial Bones: Paranasal sinuses. Temporal bone. Dental Radiography, Radiography of teeth-intra oral, extraoral and occlusal view.

Abdomen: Preparation of patient, General. Acute positioning for fluid and air leaves. Plain film examination, Radiography of female abdomen to look for pregnancy.

Macro radiography: Principal advantage, technique and applications.

Stereography- Procedure-presentation, for viewing, stereoscopes, steremetry. High KV technique principle and its applications. Soft tissue techniques, Mammography, Localization of bodies.

Ward mobile radiography: General precautions, Aspesis in techniques-Checking of mains supply and functions of equipment, selection of exposure factors, explosion risks. Radiation protection and rapid processing techniques.

PRACTICALS BASED ON THEORY

BACHELOR OF MEDICAL RADIO IMAGING TECHNOLOGY
(B.M.R.I.T IINd Year)

PAPER IVTH EQUIPMENTS FOR RADIOTHERAPY INCLUDING NEWER DEVELOPMENTS

Orthovoltage equipment with special reference to physical design requirement of tube and its accessories and interlocks, gamma ray sources used in radiotherapy especially cobalt 60 source its construction and source housing and handling mechanism. Principles of isocentric tele-isotope machines megavoltage x-rays and electron beam accelerators and belatron. Salient features of components of linear Accelerator like tube design, wake guide, target design beam bending system. Radio-frequency generators kile magnetron and liestron basic principle of remote after-loading system/ machines for making casts Sterofoam template cutting system introduction to radio-surgery equipment and dosimetry equipment.

PRACTICAL BASED ON THEORY

BACHELOR OF MEDICAL RADIO IMAGING TECHNOLOGY
(B.M.R.I.T IINd Year
PAPER VTH REGIONAL RADIOGRAPHY & RADIOLOGICAL PROCEDURES

REGIONAL RADIOGRAPHY

Common terminology

Radiography of each part positioning

Patient handling & Preparation

Drugs in X-Rays dept

Clinical, Ethical & Legal Responsibility, (including medico legal /Accident cases)

RADIOLOGICAL PROCEDURES

Contrast media-Types, Properties, reaction &Treatments.

Genitourinary system-IVU, MCU, RGU, HSG

GI tract-Ba Swallow, Ba meal, Ba Follow through, Ba Enema, Small bowel enema, Double Contrast Enema Sialography.

Bilary Tract-OCG, IVC, EPCP, PTHC, T-tube & Operative Cholangioraphy.

Myelography

DARK ROOM PROCEDURE.

Sitting Lay out & fittings

Cassette & Film Handling-Loading & Unloading, safe light.

Manual & Automatic Processing-Practical Aspect.

PRACTICAL BASED ON THEORY

BACHELOR OF MEDICAL RADIO IMAGING TECHNOLOGY
(B.M.R.I.T IIIRD Year
PAPER IST ORIENTATION IN CLINICAL SCIENCES

(Only Outline i.e. Clinical features & Lab Investigation of the following conditions)

UNIT-I

MEDICINE

Pericarditis

Valvular diseases

Rhematic Heart Disease

Heart failure

Chronic Bronchitis

Emphysema

Brochietasis

Pneumonia

Tuberculosis

Pleura effusion

Empyema

Spntaneus Pheumothorax

UNIT-II

Achalsia Cardia

Peptic ulcer

Intestinal obstruction

Crohns disease

Ulcerative Colitis

Pancreatitis

Portal Hypertension

Ascitis

Cirrhosis

Cholecyslitis

UNIT-III

UTI
Glomerulonephritis

Nephrotic sysdrome

Urinary Calculi

Polysystic Kidney disease

Cerebral Vascular Dsorders

Meningitis

Encephalitis

UNIT-IV

ORTHPAEDICS

Fracture

Type Mechanism, Healing, Delayed Union, Non- complication

Injuries of the shoulder gridle, Dislocation of shoulder

# of Humerus, Elbow Forearm

Of Distal Radius & Ulna

Injuries of the Capus

Dislocation of Hip

Femur, Tibia, Ankle, Calcaneum

Acute & chronic osteoarthritis

Rhematoid arthritis

Pagets Disease

Ankylosing spondylitis

Club foot

Bone Tumour- Benign, Malignant

UNIT-V

Surgery

Cholelithiasis

Peritonitis

Subphremic Abcess

Appendicitis

Hydronephrosis

Benign Hypertrophy prostatye

Sinusitis

OBSTRETRICS

Diagnosis of Pregnancy

Normal Labour

BACHELOR OF MEDICAL RADIO IMAGING TECHNOLOGY
(B.M.R.I.T IIIRD Year)
PAPER IIND RADIOTHERAPY PLANNING AND QUALITY CONTROL &RADIATION THERAPY

Definition of treatment planning. Planning procedure in general with special emphasis on tumour localization and target volume measurement by conventional radiographic method and simulator imaging. Role of special contrast medium base radiotherapy. CT/MR/Ultrasound/radionuclide imaging methods. Physical and clinical requirements of field secretion of treatment in Teletherapy Role of portal films in treatment planning. Chose of central axis percentage depth dose data and isodose curve from a spectrum of radiotherapy beams used fortratment. Requirement and practice of organ shielding single, multiple fields, pendulum and rotational field therapy, planning procedures. Computerized treatment planning system choice of dose, time and fraction. Safety of critical organs in planning methods. Role of treatment shell immobilization devices and later in patients set up and positioning.

Acceptance test on therapy simulator teleisope megavollege-X-ray and electron beam machines. Contribution of technologist in radiation calibration quality control assurances execution of radiation treatment.

PRACTICAL BASED ON THEORY

BACHELOR OF MEDICAL RADIO IMAGING TECHNOLOGY (B.M.R.I.T) IIIRD Year
PAPER IIIRD
EQUIPMENT OF RADIO-DIAGNOSIS ULTRASONOLOGY & CT SCANNING INCLUDING NEWER DEVELOPMENT AND QUALITY CONTROL.

Special Radiology Equipment

- Image intensifier & TV Monitor
- Mammography
- Digital Radiography
- Pictorial archiving & Communication system (PACS)
- Computers in Radiology

Computed tomography: Historical developments, its principle and applications, various generatons and definition of terms and cross sectional Anatomy.

Recent Developments in CT- Special CT (Triple phase CT study for hepatic & Fancreatic tumor, Multislice CT, Principles of CT Angio, CT guided biopsies & drainage

Diagnostic Ultrasound: Its principle applications and role in medicine Various typed of transducers and definition terms and cross sectional anatomy.

Digital Radiography: Principle scanned projection radiography digital substraction angiography application and definitions of terms.

M.R.I.: Principle, applications its advantage over computed tomography or ultrasonography. Its limitations and use and cross sectional anatomy.

Q.A. Programme i.e. Phases of development of radiological facility Q.A activities

application in:-

1. Equipment selection phase.
2. Equipment installation of acceptance phase.
3. Operational phase.

PRACTICAL BASED ON THEORY

BACHELOR OF MEDICAL RADIO IMAGING TECHNOLOGY
(B.M.R.I.T IIIRD Year)
PAPER 4TH
SPECIAL RADIOGRAPHIC TECHNIQUES INCLUDING SPECIAL PROCEDURES

Radiological procedures pertaining to salivary glands, lacrimal system, brochography arthrography and hysteron salpangiography various requirements trolley setup, indications and contra indications, contrast media used.

Ventriculography and encephalography- Technique, contrast media used, film sequence, indication contra indications.
Myelography: Technique, contrast media used injection of contrast media, indications and contraindications.

I.V.P and cytography etc.

Intra venou cholangiography T. tube: Cholangiography Preoperative cholangiography procedure contrast media indication & contra indications.

Double contrast Barium studies (small Bowel enema Ba enema etc) preoperative cholangiography procedure contrast media indications and contrast media used.

Angiography: Cerebral cardiac abdominal aortography general ennal and selective renal.

Splenoportovenography peripheral arterial and venous angiography precaultions radiation Protection film charges manual automatic biplane film types large miniature cine contrast Media injection procedure and technique.

Interventional radiological procedures:

PTC, PTBD, ERCP, fine neddle aspiration cytology precutaneous nephorostomy. Cardia Catherization embolization dilation etc.

ICU- Radiography

PRACTICAL BASED ON THEORY

BACHELOR OF MEDICAL RADIO IMAGING TECHNOLOGY
(B.M.R.I.T IIIRD Year)
PAPER 5TH
RADIOTHERAPY AND BRACHYTHERAPY TECHNIQUES IN MALIGNANT AND NON-MALINANT DISEASE

Orthovoltage techniques in skin tumors and cancers of the breast. Advantage and disadvanta of orthovoltage in radiotherapy. Teleisotope cobalt therapy techniques in skin and deep sea tumors, Parallel opposed fields and small beam directed therapy and wedge field techniques heads and neck tumors especially cancers of larynx treatment techniques for cancer of maxillary antrum and pituitary tumors. Treatment techniques in cancer of breat by telecobalt and energy megavoltage x-ray and electron beam. Tele and brchytherapy techniques of treatment different stages of carcinoma cervix uteri with special embasis on HDR and LDR brachytherapy. Three field techniques in cancer of esophagus and bladder. Radiotherapy techniques medulloblastoma. Whole body and hemibody radiation techniques. Treatment techniques malignant and non-malignant conditions in ovarian and kidney tumors. Radiation treat techniques of lymphomas with special emphasis on mantle field irradiation Radiotherapy techniques in head and neck cancer.

Salient features of computers in radiotherapy and its application:

Introduction to computer, Hardware and software component. Input and output data system. Computerized treatment planning in tele, brachy therapy and documentations.

Radiological Protection

Dose limits of occupational workers & Publics.

Principle & Method of Protections.

Monitoring devices.