# M.Sc. (Radiation Technology)

## (Previous)

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Paper code</th>
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<th>M.M.(T./S./P.)</th>
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<tbody>
<tr>
<td>1.</td>
<td>MRT-101</td>
<td>Human Anatomy &amp; Physiology</td>
<td>70+30</td>
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<tr>
<td>2.</td>
<td>MRT-102</td>
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<td>MRT-103</td>
<td>Image Production &amp; Evaluation</td>
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<td>Radio Diagnosis &amp; Radio Graphic Procedures</td>
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<td>Radiation Hazards, Prevention and Safety</td>
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<td>Radio Imaging &amp; Diagnosis-I</td>
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<tr>
<td>1.</td>
<td>MRT-201</td>
<td>Radiation Protection &amp; Advanced Diagnostic Techniques</td>
<td>70+30</td>
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<td>MRT-202</td>
<td>Ultrasound and Computerized Tomography</td>
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<td>MRT-203</td>
<td>Radiography &amp; Photography</td>
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<td>MRT-205</td>
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<td>6.</td>
<td>MRT-206</td>
<td>Recent Advancements in Modern Imaging Technology</td>
<td>70+30</td>
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<td>7.</td>
<td>MRT-207P</td>
<td>Radio Imaging &amp; Diagnosis-II</td>
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<td>8.</td>
<td>MRT-208</td>
<td>Dissertation</td>
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Details of Syllabus

(Previous)

MRT-101- HUMAN ANATOMY & PHYSIOLOGY

I.

Introduction:
Overview of the structure Organization of the human body
Anatomical terminology as communicative device.

Cell-
Cell morphology and diversity
Introduction to ultra structure and function of cell organelles and cell inclusions.

Tissues-
Macroscopic and microscopic studies of epithelial tissue, general
connectivetissue, cartilaginous tissue, bone tissue, muscle tissue, nervous tissue and the integument,
major functional advantages of each tissue type.

Skeletal Muscles-
Major skeletal muscles of the head, Neck, Thorax, Abdomen and upper and lower limbs.

General Osteology-
General morphology of bones Structural classification of bones
Identification and naming of individual bones of the skeleton Development and
growth of skeletal tissue and bones.

General Astrology-
Structural and functional classification of joints
General morphology of a synovial joint and associated structures Movements made
available by synovial joints
Detailed Osteology and Astrology-
Naming and identification of osteological features of individual human bones
Naming, Identification and application of classifications to the major joints of the
human body. Examples of variability in the human skeleton.
II.

**Cardiovascular System:**
Macroscopic features, function and location of the adult and foetal heart and the location of major arteries and veins
Macroscopic features of blood vessels including arteries, veins and capillaries; morphological features of the cellular components of blood.

**Lymphatic System:**
Macroscopic features, Major function and location of the lymphatic vascular structures, Lymph nodes, Tonsils and other mucosa-associated lymphatic tissue, Spleen and thymus; Microscopic anatomy of lymph nodes.

**Nervous System:**
Macroscopic features and major functions of the brain and spinal cord
Morphological features and major functions of the contents of the peripheral nervous system and autonomic nervous system.

**Respiratory System:**
Macroscopic features and major functions of the nasal cavity Paranasal sinuses Pharynx, Larynx, Trachea, Bronchi, Lungs and Thoracic wall including the thoracoabdominal diaphragm
General microscopic anatomy of the epithelium of the respiratory tract and the lungs.

**Digestive System:**
Macroscopic features and major functions of the Mouth, Salivary glands, Pharynx, esophagus, stomach, small and large intestines, liver pancreas, biliary system and peritoneal cavity; general microscopic anatomy of the esophagus, stomach, small intestine, pancreas and liver.

III.

**Urinary System:**
Macroscopic features, Major functions and location of the kidneys, Ureters, Urinary bladder and the urethra; Microscopic anatomy of the kidney.

**Endocrine System—**
Macroscopic features
Location and basic function of the hypothesis cerebri
Thyroid gland
Parathyroid glands
Suprarenal glands
Pineal gland and organs with a minor endocrine function
Microscopic anatomy of the hypothalamus
Thyroid gland, Bulbourethral glands.
Male Reproductive System-
Macroscopic features, Major functions and location of the scrotum, Testes, Epididymis, Ductus deferens, Inguinal canal, Seminal vesicles, Prostate gland, Bulbourethral gland and penis; Microscopic anatomy of the testis.

Female Reproductive System-
Macroscopic features
Major functions and location of the ovaries
Uterine tubes, Uterus, Vagina and external genitalia; Microscopic anatomy of the ovary. Special Senses-
Macroscopic features and major functions of the contents of the orbital cavity, The eyeball, Lacrimal apparatus, and external, Middle and internal ear; Microscopic anatomy of the photosensitive retina.

IV.

**Upper Limb:**
Relevant osteology
Detailed plain radiographic anatomy of skeletally mature and immature individuals
Regional and surface anatomy of the shoulder, axilla, and upper limb with and emphasis on blood and lymphatic vessels
MRI and axial sectional anatomy of the glen humeral joint.

Lower Limb- Relevant osteology
Detailed plain radiographic anatomy of skeletally mature and immature individuals
Regional and surface anatomy of the hip, thigh, crus and pes, with an emphasis on blood and lymphatic vessels
MRI of the knee joints; angiography of the lower limb.

Head and Neck-
Relevant osteology of the skull and cervical vertebrae, Surface anatomy, Lymphatics, Major blood vessels and nerves of the head and neck
Regional anatomy of the brain and its meanings-
Axial, Coronal and Sagittal sectional anatomy of the head and axial sectional anatomy of the neck
Plain radiographic anatomy
Computerized tomography
MRI and angiography of the head and neck.

V.

**Cross sectional anatomy of body:**
Radiographic anatomy of different radiographs in various projections Surface anatomy and applied anatomy pertaining to Radiology.

VI.

**General Physiology:**
Structure of cell membrane.
Transport across cell membrane and Homeostasis
Blood-ABO System & mismatch-transfusion
WBC plasma protein Erythrocytes
Hemoglobin. Normal values of Blood(composition & function)Nerve Neuron
AHC-Structure, Classification & Properties R.M.P., Action potential
Propagation of nerve impulse
Degeneration & regeneration
Reaction of degeneration.
Muscle-Structure-properties-classification-excitation/contraction coupling, Motor, EMG.

VII.

**C.N.S. & P.N.S.-Receptor Physiology:**
Classification & properties
Synapse structure Properties, &
transmission
Reflexes-structure, properties, & transmission
Sensory & Motor Tracts-effect of transaction(Complete & Incomplete) at various levels Physiology of Touch, Pain, Temperature & Perception
Physiology of Muscle Tone(muscle spindle), Stretch, Vestibular Apparatus mainly organ Anatomy, Function of Basal ganglia, Thalamus, Hypo-Thalamus, Pre-Frontal lobe, P.A.S., Sensory/motor cortex, Sensory/motor cortex, Limbic System, Learning, memory & condition reflex.

**READINGS:**
A. Anatomy and Physiology for Radiographers-C.A.Warrick
B. Gray’s anatomy Descriptive and applied–T.B.Johnstor.
C. Foundation of Anatomy and Physiology-RossandWilson
D. An Atlas of Normal Radiographic Anatomy-Richard & Alvin

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I.

**Introductory Pathology:**
Cellular adaptation and cell death
Inflammation and repair; infection; circulatory disorders; immune defense; Genetics of disease
Neoplasia
Cell injury and adaptation-
Atrophy, Hypertrophy, Metaphase, Hyperplasia
Classification of tumors, Premalignant lesion
Types of inflammation & system manifestations of inflammation Disorders of vascular flow & shock (Brief introduction)
Oedema, Hyperemia or congestion, Thromboses, Embolism, Infarction, shock, Ischemia, Over hydration, Dehydration
The Response to infection
Categories of infectious agents, Host barriers to infection
How disease is caused
Inflammatory response to infectious agents Hematopoietic and Lymphoid System-Hemorrhage, Various type of
Anemia, Leucopenia, Leukocytosis, Bleeding disorders, coagulation mechanism.

II.

**Fundamentals of Medical Terminology:**
Word Roots, Prefix, Suffix, Abbreviations & Symbols
Intro duction to Anatomy & Physiology
Organs & Systems
Gastrointestinal, Respiratory, Circulatory, Renal, Reproductive, Nervous, Common Diseases & Procedures, Gastrointestinal, Cholecystitis, Cholelithiasis, Appendicitis, Intestinal Obstruction, Peritonitis, Gastroscopy - Endoscopy, Laparotomy, laparoscopy, Common Diseases & Procedures, Respiratory, Tuberculosis, Bronchial Asthma, Respiratory Failure, Pulmonary Embolism, Pneumonia, Bronchoscopy, Pulmonary Function test, Cardio-Pulmonary, Resuscitation.

III.

**Fundamentals of Medical Terminology - II:**
Circulatory, Hypertension, Coronary Artery Disease, Arrhythmias, Cardiac Arrest, Shock, Deep Vein Thrombosis (DVT), ECG, 2DEchoCardiogram, Coronary Angiography, Cardiac Catheterization, Stress test, Pacemaker, Renal, Nephrotic
Syndrome, Urinary Tract Infection, Renal/Bladder Stones, Intravenous Pyelography, Cystoscopy, Urinalysis, Haemodialysis, Peritoneal Dialysis, Reproductive, Female-breast cancer/Self Examination, Menstrual Disorders, Dysmenorrheal, Premenstrual Syndrome (PMS), Menorrhagia, Ovarian Cyst, Fibroids, Malignancy, Infertility, Mammography, Ultrasound, Laparoscopy, IVF, Tubectomy, D&C, Male-Prostate Enlargement, Hydrocele, Impotence, Transurethral Resection of Prostate, Nervous Stroke (Cerebrovascular Accident), Brain Tumor, Brain Injuries, Spinal Cord Injuries, Lumbar Puncture, Myelography, CT Scan,

READINGS:

A. Robbins Basic Pathology
B. Robbins and Cotran Pathologic
C. Basis of Disease Medical Terminology for Health Professions

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MRT-103- IMAGE PRODUCTION & EVALUATION

I.
Factors affecting recorded detail
: Density
Distortion and contrast
The relationship among density, distortion, contrast, and recorded detail
Factors that govern the selection of films, screens and grids
The relationship between films and screens
The effect of factors influencing exposure control such as the nature of the radiographic procedure, films, screens, and grids selected; power setting used; and beam limitation and scatter
Exposure calculations for various radiographic procedures
Advantages and disadvantage associated with automatic exposure control.

II.
Factor affecting the decision to use automatic exposure controls:
Simulated radiographic procedure, Use, Technique, Charts to select exposure factors, Film storage Considerations

Radiographic identification procedures
Periodic maintenance for automatic film processors
Procedures for loading and unloading
Computed radiography systems.

III.
Digital Image:
The effects of frequency, Contract, and noise on digital image quality
Function of digital image window level and width controls
Picture archival and communication systems (PACS).
MRT-104 - EQUIPMENT OPERATION & QUALITY CONTROL

I. Various Radiographic equipment and accessories:
   - Component parts labeling
   - Equipments used for Sonography
   - Computed radiography
   - CT technology
   - MRI technology and digital radiography
   - Differences in various types and models of portable radiographic equipment
   - Differences in portable and non portable radiographic equipment.

II. X-Ray Tube:
   - Theory of operation of an X-ray tube
   - Construction and function of an X-ray tube
   - Determine the maximum allowable exposure factor for various radiographic procedures
   - Using an X-ray tube rating chart
   - Simulations of radiographic exposures and anode and tube housing cooling charts
   - Determine the rate of anode and tube housing cooling.

III. Safety checks of radiographic equipment:
   - Safety checks of radiographic equipment and accessories such as lead aprons and gloves
   - and collimator accuracy
   - Identify symptoms of malfunctions in radiographic equipment
   - Procedures for malfunctions of radiographic equipment
   - Detailed of Sonography
   - CT scan & MRI

READINGS:

A. Essentials of Radiologic Science Workbook Robert A. Fosbinder
B. Textbook of Radiographic Positioning and Related operation and quality control.

MRT-105 - RADIO DIAGNOSIS & RADIO GRAPHIC PROCEDURES

I.
Positioning Terminology:
Types and functions of immobilization and positioning devices, Radiographic procedure, Appropriate breathing instruction for patient positioning and technique variations for various radiographic procedures. Procedures for patient preparation.

II. Types of Contract Media:
Contract media with radiographic procedures
Specific contract medium
Indications, Contraindications and the adverse reactions associated with its use.
Routine and special radiographic procedures
Steps for patient preparation and patient positioning
Routine and special radiographic procedures
Equipment needed and the exposure setting that are consistent with A.R.R.T. specifications.

III. Different Radiographic Procedures:
Learning & system of Sonography
Different means of Sonography and diagnostic procedures
Learning regarding advancement and new technology in the field of radio diagnosis
Learning regarding CT scan, complete functioning
CT scan a way of diagnostic procedures
Learning in MRI
Techniques and its usefulness in different diagnostic procedures Learning of different aspects of digital radiology, CR System and DSA.

READINGS:
A. A Guide to Radiological Procedures by Stephen Chapman

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MRT-106- BIOSTATISTICS AND HOSPITAL MANAGEMENT

I. Introduction and Some Basic Concepts:
Measurement of central tendency.
Measures of variation. Frequency distribution.

II. Concept of Probability:
Laws of Probability. Probability Distribution
Binomial, Normal and Chi-squared distribution
Commonly used procedures and test of significance and estimation
Correlation and regression
Test of significance namely Z test, T test, Chi square test, F test Analysis of variance.

III. 
**Research Statistics:**
Research Statistics pertaining to medical laboratory technology Testing the efficacy of manufacturing drugs Medicines and injections for curbing and controlling specific diseases Statistical analysis of instrumental data and comparison of various biological techniques used in hospitals.

IV. 
**Healthcare— an overview:**
Function of Hospital administration Modern techniques in Hospital management Challenges and strategies of Hospital management Administrative Functions— Planning, Organizing, Staffing, Leading and Controlling Organizational Structure, Motivation and leadership.
Designing health care organization.

V. 
**Hospital Management:**
Medical record, House-keeping services. Laboratory performance.
Management of biomedical waste.
Total patient care— indoor and outdoor. Nursing and ambulance resources.
Evaluation of hospital services. Quality assurance. Record reviews and medical audit.

**READINGS:**

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**MRT-107- PATIENT CARE & EVALUATION**

I. 
**Patient Care:**
Principles of body mechanics applicable to patient care
Procedures for patient transfer such as table to table, table to wheelchair, wheelchair to bed, bed to stretcher, the three-man lift, and draw sheet lift
Procedures for turning patients who have severe trauma, Unconsciousness, Disorientation, or Amputated limbs
Radiographic procedures Patient preparation stamps.
II. Radiographic Procedures:
Radiographic procedures using contract agents
Appropriate contrast agent for each procedure Discuss
patient preparation in terms of procedures
Indications, Contraindications and symptoms of treatment for adverse reactions to contrast agents
Disinfection and sterilization procedures in terms of types and methods used-
Procedures for scrubbing, Donning gowns and gloves, Removing gowns and gloves, and handling sterile instruments. Procedures for handling and disposing of infectious wastes
Isolation techniques-,function, purpose and procedures.

III. Management of infectious patients:
Psychological considerations for the management of infectious patients
The vital signs used to assess patient condition
Measurements of temperature, pulse, blood pressure, and respiration
Clinical measurement and recording of temperature, pulse, blood pressure and respiration.
Symptoms of cardiac arrest, anaphylactic shock, convulsion, seizure, hemorrhage, apnea, emesis, aspiration, fractures and diabetic coma/insulin reaction

READINGS:

A. Principles and Techniques of Patient Care
B. Pierson and Fairchild's Principles & Techniques of Patient Care.

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MRT-108- RADIATION HAZARDS, PREVENTION & SAFETY

I. Radiation Protection:
Principles
History & development-National & international agencies, A ERB, BARC, ICRP, WHO, IAEA and their role
Equivalent dose, effective dose sievert- rem
Sources of radiation-natural man made & internal exposures

II. Biological effects of Radiation:
Effects on cell-stochastic&deterministic effects-radiation risk-tissues at risk-
genetic, Somatic & fetus risk-risk at other industries
Dose equivalent limits- Philosophy-ICRP(60) Concepts-AERB guidelines.
III. **Planning of Radiation Installation:**
Protection primary leakage and scattered radiation
Concepts of workload-Use factor, Occupancy factor & distance
Barrier design-Barrier materials-concrete, brick & lead Primary &
secondary barrier design calculations.

IV. **Personnel Monitoring Systems:**
Principle and objective-film badge-guidelines for use-Thermo luminescent dosimeter,
Badge-pocket dosimeter
Area monitoring and radiation survey-
Practical use of survey meter, Zone monitors and phantoms, Survey in x-ray, fluoroscopy and CT scan units.

V. **AERB safety code and ethics:**
Built in safety specification for diagnostic x-ray Fluoroscopy and CT units
Specification for radiation protection devices-room layout
Operational safety-Radiation protection programme-Personnel requirements and responsibilities-
regulatory controls

VI. **Patient Protection:**
Safe work practice in diagnostic radiology-Radiation absorbed dose from general dental fluoroscopy
X-ray and CT examinations
X- ray examinations during pregnancy
X-ray examinations associated with illness, not associated with illness-medico-
legal or insurance purpose
X-ray examination: Medical research
X-ray avoidance of unnecessary radiation dose

VII. **Radiation Emergencies:**
Situation preparedness, safety and prevention-legal requirements Recent developments in radiation safety related topics.

**READINGS:**

A. Radiation Protection in Hospital. Richard F. Mould
B. Basic radiological physics, Jaypee bothers pvt. Ltd New Delhi
C. An Introduction to Radiation Protection Allen Martin“ & Samuel
D. Radiation safety in Medical practice. M.M.Rechami.

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MRT-109P- RADIO IMAGING & DIAGNOSIS

I. Practical-I
Radiographic positioning of various parts Immobilization technique in pediatrics radiography Selection of contrast media & its application
Its indication and contraindication, management of reaction/side effects
Application of conventional radiography, USG, CT & MRI techniques
Systematised use of CR, DR, DSA etc.
Recent radiological techniques

II. Practical-II
Practice of statistical data of radiological patients
Demand and expenditure of consumable items in radiology
Repeat film analysis, Film fog analysis
Film processing chemical audit
Justification of Radiological procedure & its importance in various ailments.
Preparing of charts and statistics of radiological procedure showing their use and advantage Patient identity
Care of critical ill patient
Emergency patient
Management of unconscious patient's radiological investigation
Various techniques of shifting the patient on x-ray couch and off the couch
Measuring of BP, PULSE, application of oxygen,

III. Practical-III
Radiation hazards & protection of worker patient and gen. Public
Use of protective devices
Use of ionization chamber
Use of TLD badges
Management and care of radiation injuries

IV. Practical-IV
Identification & thorough knowledge of human body’s anatomy and physiology
Reorganization of all radiological anatomy on imaging film
Knowledge of body systems and their function and practical demonstration
Physiological exercises acute & chronic muscle strength power
Practice of physical rehabilitation
Benign and malignant pathological specimens identification, oncology division (Med. Surg. & Radiation)
Practice of image development manually and automatically and dry film processing
Chemistry
Laser printers, Laser camera, Combination of film screen cassette
I.P. exposure selection for particular radiological procedure,
Anatomical landmarks for field selection during radiological investigation
Dark room design & selection
Loading/ unloading of cassettes, Dry and wet area in dark room AEC,CRR,DR,PACS

V. Practica-IV
Diagrams of body parts radiographic equipments X-ray
tube, models
Use of portable radiography machines Detail practical of CT, MRI & USG

**READINGS:**


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(Final)

MRT-201- RADIATION PROTECTION & ADVANCED DIAGNOSTIC TECHNIQUES

I. **Beam Restricting Devices:**
   Describe the use and function of beam limiting devices
   Beam filtration and shielding devices
   Relationship between exposure factors and patient dosage
   Nature and function of the ten-day rule
   Screen and exposure setting combination that will minimize the radiation dosage that patients receive.

II. **Radiographic Procedures:**
   Methods to avoid repeat radiographs
   Purpose of primary and secondary radiation barriers and room construction and design
   Intermsof personnel protection
   Radio diagnosis & radiographic equipments and techniques used to reduce personnel exposure during radiographic
   Fluoroscopic, mobile, and surgical procedures.

III. **Radiographic Devices:**
   Types and purposes of personnel protective devices used during radiographic, fluoroscopic,
mobile, and surgical procedures
Types, uses, and purpose of patient restraint devices for reducing personnel radiation exposure
Personnel monitoring devices in terms of purposes, types, characteristics, advantages and disadvantage.

IV. 
**Introduction to computer:**
History and development of computer
Basics storage and transfer of data-operation of computer, Performance of computer systems
Computer software and hardware
Storage acquisition processing and display of digital images-Care and preventive maintenance of the computer system.

V. 
**Computed Tomography**
Basic principle-data accumulation-image reconstruction Storing the image, Viewing the image, Evaluation of image
Equipment for tomography-Table gantry-x-ray generator-different generation-Image quality
Patient exposure-artifacts
Magnetic resonance imaging-Basic principle-Instrumentation-Magnetic field gradient coils-Spin echo imaging sequence-Multi slice imaging-multi echo imaging-contrast-multi planar imaging-inversion recovery
Pulse sequence-Signal to noise ratio.

VI. 
**Digital Radiographic Imaging:**
History and development Theory and Principle Digital fluoroscopy system-digitized image -digital, subtraction techniques-digitalimageprocessing-futureequipmentdevelopments-Clinicalapplication-PACS (Picture Archival and Communication System),

VII. 
**Interventional Procedures:**
C.T. Guide procedures
**MRT-202-ULTRASOUND AND COMPUTERIZED TOMOGRAPHY**

I. **Measures to Control Scatter Radiation:** Recent developments in x-ray tube technology. Advancements in H. T. generators. 
   Measure to control scatter radiation including-Beam centering devices, Collimator cone diaphragms and grids. Fluoroscopy and IITV systems- Cine radiography with various recording devices. 
   Tomography principles.

II. **Computed Tomography:**
   Principle, Data acquisition, Concepts, Image reconstruction, Instrumentation, Image manipulation.
   Historical developments-Various generators, Spiral/helical, Single slice. 
   Multi slice CT, Electron beam CT, Mobile CT, Advance volume scanning, Continuous sub second scanning, Real time CT.
   Fluoroscopy Interventionalguidancetool3DCTAngiography Virtual reality imaging. 
   Including image quality and quality control in CT scanners Computer Tomography Various imaging protocols and technique.

III. **Basic principles of U.S.** Various types of transducer Mechanism of image form actions of Abdominal organ and pelvic organ(Aorta IV, C Liver, Gallbladder, Pancreas, Spleen, Kidney, Urethras, Urinary bladder etc) various advancement, Doppler and image artifacts, Physical aspects of ultra sonography including Doppler color Doppler flow imaging Power Doppler Clinical application of U.S. including use of contrast media in U.S.

**READINGS:**

A. Fundamentals of Diagnostic Radiology William E. Brant, Clyde A. Helms

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**MRT-203-RADIOGRAPHY&PHOTOGRAPHY**

I. **Photographic Process:**
   Radiographic film Image processing
   Manual as well as automatic, Sensitometer, Intensifying screens
   Film/screen combinations/analyzing the image

   Establishing image standards-
Professional imaging standards, The analytical process, Acceptance limits

Radiographic Quality:
Density: contrast, Recorded detail, distortion

The art of films critique-

II. Quality Management:
Quality assurance and quality control
Comparing exposure systems
Developing exposure charts
Fixed kilovolt age system, Variable kilo volt age system
Other exposure systems
Automatic exposure controls

III. Exposure conversion problems:
Planning of a processing room as well as of a radiology department
Daylight processing system
Image recording devices-
Video recorder, Multi format camera, Laser camera, Dry camera etc.
Photo fluoroscopy
Special imaging processes-
Copying, radiography, Xero-radiography, Subtraction technique.

READINGS:
Medical Radiographic Technique and Dark Room Practices Krishna murthy

MRT-204- SPECIAL INVESTIGATION & TECHNOLOGY

I. Special Investigation:
Soft tissue radiography, High KV techniques, Macro Radiography, Mammography
Foreign body localization.

II. Types of Radiography:
Operation the after radiography
Trauma and ward radiography
Pediatric radiography
Special procedures: HSG, Myelography, Orthography, DCG

III. Interventional procedures:
PTC, ERCP, PCN and FNAC: Fluoroscopy/US/CT guided, Angiographic procedures
Vascular/non-vascular
MRI-Various imaging protocol sand techniques Digital imaging

IV. Use and function of beam limiting devices:
Beam filtration, and shielding devices.
Relationship between exposure factors and patient dosage Nature
nd function of the ten-day rule
Screen and exposure setting combination that will minimize the radiation dosage that patients receive.

V. Methods to avoid repeat radio graphs:
Purpose of primary and secondary radiation barriers
Room construction and design in terms of personnel protection
Radio diagnosis, Radiographic equipments and techniques used to reduce personnel exposure during radiographic,

VI. Types and purposes of personnel protective devices:
Types and purposes of personnel protective devices used during radiographic, fluoroscopic, mobile, and surgical procedures
Types, uses, and purpose of patient restraint devices for reducing personnel radiation exposure. Personnel monitoring devices in terms of purposes, types, characteristics, advantages, and dis advantage.

READINGS:
A. Introduction to the Principles of Medical Imaging Chris Guy, Dominic Fitches.

MRT-205-MRIANDNUCLEARMEDICINEIMAGING

I. MRI:
Basic principles of MRI
Complete imaging equipment and various requirements Basic principles of MRI T1 and T2 Relaxation Behavior soft issues T1 T2 and proton density images Spiral localization of images Types of imaging sequences (Spin echo, fast spin echo, flash, inversion recovery, gradient techno etc.)
MR spectroscopy, principles and techniques Contrast agents in MRI, image quality Image artifacts and its compensators. NMR hazard and safety Advances in MRI.

II.
NMI:
Radio nuclide scanning including thyroid uptakes me as urement
Rectilinear scanner. Gamma camera, PET, SPECT - their principles
working applications and advancements.

III. Radiography:
Computerized radiography, Digital
radiography including DSA, principles,
working applications and
advancements.

MRT-206-RECENTADVANCEMENTSINMODERNIMAGINGTECHNOLOGY

I. Special Techniques:
Special Techniques of the following -
Radiographic techniques of whole upper limb & shoulder girdle
Radiographic techniques of whole lower limb and pelvic girdle
Radiographic techniques of whole vertebral column, skull, cranial bones and facial bones
Dental radiography, Intraoral, Extra oral as well as occlusal radiograph.

II. Radiographic Technique:
Radiographic technique of whole thorax including Lungs, Meditational, Heart, Ribs,
Diaphragms
Special Procedure For Liver, Pancreas, Spleen, Biliary system, GI tract and Genitourinary
tract Radiographic techniques for Obstetrics and Gynecology studies, Radiographic
techniques for cardio-vascular system Radiographic techniques for lymphatic system

III. Recent Advances:
Recent advances in Ultrasound, Probes, designing, High frequency probes and contrast sonography.

IV. Recent Advances in CT:
Recent advances in CT, MDCT, Multitube CT, Electron beam CT and latest detectors systems

V. Recent Advances in MRI
Recent advances in MRI, newer sequences, MRS, functional MRI and Cardiac MRI.

VI. Recent Advances:
Recent advances in PET-CT, newer isotopes other than FDG, PETMRI.
READINGS:

A. Introduction to the Principle soft Medical Imaging Chris Guy, Dominic Ffytche

MRT-207- RADIO IMAGING & DIAGNOSIS-II

I. Practical I-
Practical knowledge of mammography OT
Use of C-Arm II TVP ediatric
radiography Special radiography
HSG, Orthography, Interventional procedure, PTC,ERCP,US/CT guided FNAC,DSA.
DEXA
MRI protocols & application of T1*T2 WtrelaxationtimeimageMRCP

II. Practical II-
Knowledge of Radiation protection devices & AERB rules
Safety codes
Planning of X–Rayroom
Dimensions
Wall thickness Shielding devices

READINGS:

A. Introduction to the Principles of Medical Imaging Chris Guy, Dominic Ffytche.

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