



BLDE UNIVERSITY

Department of Radiology & Imaging

B.Sc. Medical Imaging Technology 2016-17

Published by

BLDE UNIVERSITY

[declared as Deemed-to-be-University u/s 3 of UGC Act, 1956 vide Government of India notification No.F.9-37/2007-U.3(A)]

The Constituent College

SHRI B. M. PATIL MEDICAL COLLEGE, HOSPITAL & RESEARCH CENTRE, VIJAYAPURA

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SHRI B. M. PATIL MEDICAL COLLEGE, HOSPITAL AND RESEARCH CENTRE

BLDEU/REG/B.Sc.MIT/2016-17/336/1

May 21, 2016

NOTIFICATION

Sub: Curriculum for B.Sc. Medical Imaging Technology (MIT)

Ref: 1. Minutes of the meeting of the 19th meeting of the Academic Council of the University held on November 25, 2015.

2. Minutes of the meeting of the 33rd Meeting of Board of Management of the University held on November 30, 2015.

The University, the Board of Management (BoM) of the University is pleased to approve the Curriculum for the **B.Sc. Medical Imaging Technology (MIT)** Course at in its 33rd meeting held on November 30, 2015.

The Curriculum shall be effective from the Academic Session 2016-17 onwards, for B.Sc. Medical Imaging Technology (MIT) Course in the Constituent College of the University viz. Shri B. M. Patil Medical College, Hospital and Research Centre, Vijayapura.

REGISTRAR

REGISTRAR

BLDE University, Vijayapura.

To,
The Dean, Faculty of Medicine & Principal
Shri B. M. Patil Medical College,
Hospital and Research Centre,
Vijayapura.

Copy to:

- The Secretary, UGC, New Delhi
- The Vice-Principal
- The Medical Superintendent
- The Controller of Examinations
- The Prof. & Head, Department of Radio-Diagnosis and Imaging
- The Co-ordinator, IQAC
- PS to the Hon'ble Vice-Chancellor

Smt. Bangaramma Sajjan Campus, Dr.B.M.Patil Road (Solapur Road), Vijayapura-586103. Karnataka. India

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Vision & Mission

- Excellence in all our endeavours.
- Committed to provide globally competitive quality medical education.
- Provide the best health care facilities in this backward region, in particular, to socially disadvantaged sections of the society.
- Constantly striving to become a Reputed research University with world-class infrastructure, latest tech-tools for teaching/research and adopting global best practices.

B. Sc. MEDICAL IMAGING TECHNOLOGY (MIT)

OVERVIEW

It is an undergraduate Medical Technologist course. It orients the students about the technique and process used to create images of the human body parts and function thereof for clinical purposes or medical providing in nature science including the study of normal anatomy and physiology. Upon completion of this program, students will not only acquire a broad & detailed knowledge in medical imaging which help them to be a new generation radiologic technologist, but also will have the opportunity to develop important practical skills in organising radiological department.

A career in Medical Imaging Technology offers a promising future, job stability and a good salary.

The program is specifically designed to prepare the graduates to pursue their career in nationally and internationally growing healthcare industry. This degree course is job oriented hence more emphasis is given on the practical aspect with adequate theoretical background.

OPPORTUNITIES FOR GRADUATES

B.Sc. (MIT) graduates have the opportunity to pursue Masters and can specialise in any of the Imaging modalities.

The graduates can work as Imaging Technologists in Hospitals with Radio diagnostic facilities both in public and private sectors.

The graduates have joined as application specialists in medical imaging equipment companies such as GE Health Care, Philips, Siemens, etc.

The graduates can also get the teaching positions in educational institutions in India and abroad and pursuing research activities in Medical Imaging Technology.

B.Sc. in Medical Imaging Technology: Who Should Opt?

B.Sc. in Medical Imaging Technology is suitable for candidates interested in expanding their prospects in the specialty of medical research and development.

Ideal candidates would be proficient in time- management, adept at finishing tasks with speed and accuracy, handling stress, interpreting scientific/technical data accurately, making analytic judgements, handling laboratory instruments and operating computer systems.

The course is ideally suited for candidates with an eye for detail, precision, self-sufficiency, self-motivation, and an ability to work within strenuous schedules

DURATION OF THE COURSE:

B.Sc. in Medical Imaging Technology is a 3- year course, divided into six semesters, each lasting a period of six months.

MEDIUM OF INSTRUCTION:

The medium of instruction and examination shall be in english

Admissions are done on the basis of marks obtained in Physics, Chemistry and Biology / Maths in the qualifying examination.

FEES

First Year BSc (MIT)

Second Year BSc (MIT)

Third Year BSc (MIT)

*Fees are subject to change without notice. The fees at the time of admission is the actual fees payable. Disputes, if any, will be redressed under the University rules and regulations.

ELIGIBILITY FOR ADMISSION:

A candidate seeking admission to the Bachelor of Science Degree Courses in the Allied Health Sciences course; shall have studied English as one of the principal subject during the tenure of the course and for those seeking admission to the B.Sc. Imaging Technology shall have passed:

1. Two year Pre-University examination or equivalent as recognized by BLDE University of Health Sciences with, Physics, Chemistry and Biology or Maths as principle subjects of study. OR
2. Pre-Degree course from a recognized University considered as equivalent by RGUHS, (Two years after ten years of schooling) with Physics, Chemistry and Biology as principal subjects of study. OR
3. Any equivalent examination recognized by the Rajiv Gandhi University of Health Sciences, Bangalore for the above purpose with Physics, Chemistry and Biology as principal subjects of study. OR
4. The vocational higher secondary education course conducted by Vocational Higher Secondary Education, Government of Kerala with five subjects including Physics, Chemistry, Biology and English in addition to vocational subjects conducted is considered equivalent to plus TWO examinations of Government of Karnataka Pre University Course.

Note:

- a. The candidate shall have passed individually in each of the principal subjects.
- b. Candidates who have completed diploma or vocational course through correspondence, shall not be eligible for this course

B.Sc. in Medical Imaging Technology: Syllabus and Course Description

A semester- wise breakup of the course is tabulated below.

1st SEMISTER B.Sc. (MIT)

Paper – I : Basic Sciences : (Anatomy, Physiology & Biochemistry)

A: ANATOMY :

GENERAL ANATOMY

A typical animal cell & draw labeled diagram.

TISSUES – Defination with example.

BONES, JOINTS & LOCOMOTOR SYSTEM In brief about long bones with example.

In brief about short bones with example.

In brief about flat bones with example.

In brief about structure of bone.

Epiphysis, Diaphysis, Metaphysis of a bone. Diagrammatic representation, Enumeration of different parts & articulation of Humerus.

Diagrammatic representation, Enumeration of different parts & articulation of Radius.

Diagrammatic representation, Enumeration of different parts & articulation of Ulna .

Shoulder joint diagrammatic representation, Enumeration of different parts of bones in the joint & their parts.

Elbow joint diagrammatic representation, Enumeration of different parts of bones in the joint & their parts.

Wrist joint diagrammatic representation, Enumeration of different parts of bones in the joint & their parts

Labeled diagram of 1st and 2nd cervical vertebrae.

Labeled diagram of thoracic vertebra.

SKULL BONES

In brief about sutures of skull vault.

In brief about sutures of skull bone.

In brief about Temporal bone.

In brief about Sphenoid bone.

THORAX / RESPIRATORY SYSTEM

In brief about diaphragm structures passing through the diaphragm.

Important contents of anterior mediastinum

Important contents of middle mediastinum

Important contents of posterior mediastinum

In brief about trachea labeled diagram.

In brief about right and left bronchus labeled diagram.

In brief about pleura, mention the two layer.

In short the three divisions of pharynx & larynx.

Process of Inspiration and Expiration.

The lobes of lung and fissures.

Diagram of division of trachea, into main bronchi.

HEART & BLOOD VESELS

Labeled diagram of heart.

Superior Vena Cava formation.

Inferior Vena Cava is formation.

Pulmonary artery and vein.

Mitral value describe in brief location and function.

Aortic value describe in brief location and function.

LYMPHATIC SYSTEM

Basic and preliminary knowledge of Lymph node

Thoracic duct – function.

ENDOCRINE SYSTEM

Location of pituitary gland. Draw a labeled diagram.

NERVOUS SYSTEM

CSF Describe functions of CSF.

Central cranial nerves & their names & their importance.

Ventricles of brain, Write their names, labeled diagram.

Important lobes of brain.

Parts of hind brain.

Basal ganglia.

Spinal cord.

Foramen – Magnum, Jugular and Ovale; (Brief Notes on)

SENSORY ORGANS

A section of the eyeball to show its main parts.

A labeled diagram of lacrimal gland duct.

SINUSES

Paranasal sinus.

In brief about maxillary, ethmoid sinus, frontal sinus & sphenoid sinus.

In brief about sphenoid sinus.

SURFACE ANATOMY

Basic radiographic line of skull.

Orbito metal line.

Nasion describe in brief.

Location C-7 vertebra.

Identify xiphisternum.

Identification of manubrium sternum. Labeled diagram of lumber vertebra.

BONES, JOINTS & LOCO MOTOR SYSTEM

Diagrammatic representation, Enumeration of different parts of bones in the hip joint & their parts.

Diagrammatic representation, Enumeration of different parts & articulation of Femur .

Diagrammatic representation, Enumeration of different parts & articulation of Tibia .

Diagrammatic representation, Enumeration of different parts & articulation of Fibula .

Diagrammatic representation, Enumeration of different parts of bones in the knee joint & their parts.

Diagrammatic representation, Enumeration of different parts of bones in the Ankle joint & their parts

Ankle joint and articulation.

Apophyseal joint of vertebra with diagramtic representation.

Facet joint of vertebra with diagramtic representation.

Intervertebral disc with a labeled diagram of parts.

RETICULOENDOTHELIAL SYSTEM

Location of spleen in abdomen – diagramatic.

Labeled diagram of liver

Labeled diagram of biliary tract (Gall bladder, common bile duct, cystic duct)

Labeled diagram of pancreas.

ALIMENTARY SYSTEM

The different parts of stomach? Draw a labeled diagram of stomach.

Diagram showing Quadrants of abdomen.

In brief about duodenum with labeled diagram.

In brief about jejunum.

In brief about ileum.

In brief about colon.

Pancreas and its function in short.

Labeled diagram of Oesophagus.

Labeled diagram of Rectum

URINARY SYSTEM

A well-labeled diagram of kidney, Ureter Bladder

Parts of urethra. Draw a labeled diagram of male urethra.

Well labeled diagram of prostate.

REPRODUCTIVE SYSTEM

Basic structure of testis with a diagram.

Labeled diagram of female genital tract.

Labeled diagram of male genital tract.

ENDOCRINE SYSTEM.

In short about Thyroid Gland. Draw a labeled diagram.

In short the suprarenal glands. Draw a labeled diagram.

SURFACE ANATOMY

Location interspace between L 4 & L 5.

Location greater trochanter of femur.

Location symphysis pubis.

Labeled diagram of Quadrants of abdomen.

B: PHYSIOLOGY :

BLOOD:-

Functions of blood.

Functions of plasma proteins.

Functions of red blood cells.

Morphological types of WBC's.

Functions of WBC's.

Functions of platelets.

Bleeding time, clotting time and prothrombin time.

What are the different types of blood groups.

Precautions to be taken before & during the transfusion of blood.

Rh Factor.

Universal donor.

Haemoglobin and its normal value.

ESR and its normal value.

ENDOCRINOLOGY:-

Hormone || Difference.

Enzyme ||

CIRCULATORY SYSTEM:-

Describe in brief procedure to measure B.P. using sphygmomanometer.

Recording of B. P.

Recording of pulse rate.

GIT:-

Salivary glands? Names based on their location.

The functions of saliva?

Mention the different parts of stomach in the diagram of stomach

Structure of pancreas. Draw a labeled diagram.

Functions of pancreas.

Important functions of stomach.

Functions of Liver.

Labeled diagram of gall bladder, common bile duct and cystic duct & function of gall bladder.

In short the Functions of small intestine.

Discuss in brief the peristalsis in G.I.T.

RENAL & REPRODUCTIVE SYSTEM.

In brief about functions of kidneys, Ureters & bladder.

Functions of Testis.

Functions of Ovary/Uterus & Ovulation.

Functions of Prostate.

In short about fertilization.

C: BIOCHEMISTRY

BASIC PRELIMINARY CONCEPTS OF BIOCHEMISTRY

- Preliminary knowledge of carbohydrate proteins and fat.
- Preliminary knowledge of enzymes
- Classification of carbohydrates.
- Classification of fat.
- Classification of proteins.

BASIC PRELIMINARY CONCEPTS OF VITAMINS

- Water soluble vitamins.
- Fat soluble vitamins

Various vitamins such as

- Vitamins "A"
- Vitamins "B"
- Vitamins "C"
- Vitamins "D"
- Vitamins "B complex"
- Vitamins "B 6"
- Vitamins "B 12"
- Folic acid

Diseases caused by deficiency of vitamins such as vitamins “A”, “B”, “C”, “D”, B/C etc.
Preliminary knowledge of kidney function test.

Preliminary knowledge of liver function test.

Testing of urine sugar.

Bleeding time , clotting time.

Normal range of Blood & Sugar, Urea, creatine, protein, serum calcium etc.

Paper – II : Radiographic Physics & radiography positioning

This syllabus is intended as a guide to the theory and practical knowledge required by the students.

Appreciation and application of all the factors listed below will enable the technologist to produce X-ray films of good quality and diagnostic value. The lectures should be linked with practical demonstration to illustrate the importance of all that goes to make up correct exposure conditions.

I. ASPECTS OF RADIOGRAPHY :

A brief outline of the formation of the latent image. Purpose of development, fixing and washing

2.X-RAY MATERIALS : X-ray film, Construction of x-ray film, Base material; coating; emulsion, anti abrasive supercoating, Storage of unexposed film materials.

Types of film, Types of photographic emulsion, size of grain, speed of the film, Characteristics and control, Screen films; non-screen film; dental films; occlusal film; duplicating films; single coated and double-coated films.

Density of an x-ray film

Correct exposure: Under and over exposure.

3. INTENSIFYING SCREENS:

Fluorescence: Construction of an intensifying screen. Types of intensifying screen. Speeds of intensifying screen. Factor affecting the speed of screens. Un-sharpness relative to the speed of the screens. Identification, mounting, cleaning and general care of intensifying screens.

4. THE X-RAY CASSETTE:

Basic construction Types of cassettes. Size of cassettes.

General care of cassettes and storage. Testing a cassette for light leakage. Testing for film screen contact.

5. DARK ROOM : Layout plan of a dark room for a small, medium and big hospital. Size of darkroom, lightproof entrances, pan box . General construction of room to provide light-proofing Chemical and radiation protection Testing radiation safety. Disposition of equipment, loading bench design, film hoppers, and types or safe lights. Test for safe light, Hangers, Types. Care of hangers. Ventilation: Darkroom illumination and colour schemes, testing & safety of illumination.

6. CHEMISTRY OF PROCESSING : X-ray developers. Basic constituents. Types of developer for manual processing. Automatic processing.

DEVELOPMENT: Effects on development of time, temperature; agitation, developer activity. Exhaustion of developer, replenishment of developer.

X-RAY FIXERS: Basic constituents and function of fixer, inclusion of hardening and other agents. Fixing Factors affecting time of fixing. Exhaustion and regeneration of a fixer.

SILVER RECOVERY : Methods of silver recovery.

7. ARIFACTS - Different types & how they are produced.

Maintenance and cleaning of equipment. System faults and quality control in automatic film processing. Film fogging. Marks or scratches on film. Improperly fixed film. Improperly dried film.

8. RADIATION SAFETY :

- Effects of radiation
- Detection and measurement
- Maximum permissible does, Protection

RADIOGRAPHY-

The term radiography technique in the text implies a full knowledge of the procedure for X-ray examination; preparation of the room, apparatus and instruments; position of the patient for at least two projections at (right angles) relative positions of the X-ray tube and patients; relevant exposure factors; use of accessories, such as radiographic cones, grids and position aids.

Throughout the course attention should be given to :

- a. The close association of theory with practical work.
- b. The anatomical and physiological basis of radiographic procedure.

The student should be made familiar with radiographic appearance both of the normal subject and of common abnormal conditions where elementary knowledge of the pathology involved will ensure the application of the appropriate radiographic technique, which may be necessary for various disabilities or types of subject. The need for radiation precautions should be emphasized, as they apply to both patients and all hospital staff.

For each area studied, the topics will be presented under the following headings.

- a) Anatomy (review)
- b) Clinical indications
- c) Preparation of the room
- d) Accessory equipment
- e) Preparation of patient
- f) Routine views
- g) Supplementary view + modification in cases of trauma
- h) Radiation protection
- i) Care of patient

For each view studied will be presented as follows:

- a) Positioning of patient
- b) Immobilisation
- c) Identification
- d) Centring point
- e) Direction of central X-ray relative to the film
- f) Parts demonstrated
- g) Exposure factor – kVp, mAs, FFD grid/non-grid screen

SPECIALIST PROBLEMS : Where appropriate tutors should refer to the following list of specialist problems, which may arise necessitating technique variations – a) Children and neonates b) Seriously ill or injured patients c) Elder patients d) Deaf and blind patients e) Language difficulties f) Unconscious patients or Anaesthetised patients.

Radiographic Positioning (Technique)

SKELETAL SYSTEM

1. UPPER LIMB : Radiography Technique for hand, fingers, thumb, wrist joint carpal bones, forearm, elbow joint, radio ulnar joints & humerus.

2. LOWER LIMB : Radiography Technique for foot, calcaneum, ankle joint, knee joint, Hip joint, pelvis.

3. SHOULDER GIRDLE AND THORAX : Radiography Technique for shoulder joint, clavicle, acromio clavicular joints.

4. VERTEBRAL COLUMN : Radiography Technique cervical spine, lumbar spine.

5. SKULL: Basic projections for cranium.

6. Cardiovascular system: Routine projections for heart.

7. Upper Respiratory System: Radiography technique for larynx, soft tissue neck ; lungs and mediastinum : technique for routine projections: lateral view, antero posterior.

8. MAGNIFICATION RADIOGRAPHY.

2nd SEMISTER B.Sc (MIT)

PAPER –I A - GENERAL PATHOLOGY

Preliminary knowledge in brief about

- 1) Infection / inflammation (definition / etiology / pathology)
- 2) Neoplasm (definition / Benign v/s malignant / spread)
- 3) Blood Cells and their function / lymph node and their function.
- 4) Blood groups / matching / cross matching / blood transfusion
- 5) Hemorrhage / thrombosis / Embolus / infarction (Definition / Pathology)
- 6) Bleeding, clotting, prothrombin time (definition, importance, normal variation)
- 7) Biopsy , FNAC (definition, methods and slide preparation)

B - MICROBIOLOGY

Preliminary knowledge in brief about

- 1) Classification of microbes (bacteria, viruses, fungi, parasitology with few examples)
- 2) Modes of spread.
- 3) Opportunistic / Hospital acquired infections.
- 4) Methods of disinfection & sterilization.

Disinfection cleaning, heat disinfection methods, chemical disinfection methods and filtration.

Sterilisation : heat method, ionizing radiation and ethylene oxide gas.

- 5) Culture sensitivity: in brief, precautions to be taken while collecting sample.

C - FORENSIC MEDICINE

- 1) Medicolegal implications of MLC xrays / importance of consent /precautions while dealing with female patients.
- 2) Professional conduct and medical ethics
- 3) Consent in detail

D - APPLIED PHYSICS

1. STRUCTURE OF ATOM

Radio active radiation

2. ELECTROMAGNETIC RADIATION : Electromagnetic radiation spectrum, common properties of electromagnetic radiation, relationship between energy, frequency, wavelength and velocity e.g. X-rays and gamma rays.

3. REVIEW OF X-RAYS : The properties of X-rays, the production of X-ray, interaction of electrons with the target, spectra of X-rays and intensity of X-ray the factors influencing quality and intensity.

4. METHODS OF MEASUREMENTS OF X AND Y RAYS : Thermoluminescent dosimeters, solid State detectors, chemical dosimeters, exposure meters, the measurement of half value layer, unit of quantity of radiation exposure definition and application of roentgen and relationship with RAD, unit of Does equivalent (REM).

5. THERMIONIC EMISSION AND X-RAY TUBES : The thermionic diode.

PRODUCTION & CONSTRUCTION OF X-RAY TUBE : Gas filled x-ray tube, construction working and limitations; stationary anode x-ray tube; construction, working, methods of coding the anode, rating chart and cooling chart; rotating anode x-ray tube; construction, working rating chart, speed of anode rotation, angle of anode inclination, dual focus and practical consideration in choice of focus, anode heel effect grid controlled x-ray tube; effect of variation of anode voltage and filament temperature; continuous and characteristics spectrum of x-rays, inherent filter and added filter, their effect on quality of the spectrum.

6. RADIATION PROTECTION : Introduction, Maximum permissible Dose, the code of practice, protective materials for X and gamma radiation, Radiation monitoring, evaluation of workload, occupancy and use factors in diagnostic X-ray departments, diagnostic X-ray department planning, protection regulation in fluoroscopy, radiography.

7. MAIN POWER SUPPLY : A.C. and D.C. power supply with examples, single phase and poly phase power supply, switches, fuses, circuit breakers, earthing etc. main voltage drop causes and remedy, cables; low tension, high tension.

8. RECTIFICATION : principle of rectification, wave form of half wave and full wave current/voltage wave form; Rectifiers: valves, metal rectifiers, semiconductor rectifiers relative merits and demerits, silicon, germanium diodes.

Paper - II: Imaging Physics & Radiographic Positioning

The term radiography technique in the text implies a full knowledge of the procedure for X-ray examination; preparation of the room, apparatus and instruments; position of the patient for at least two projections at (right angles) relative positions of the X-ray tube and patients; relevant exposure factors; use of accessories, such as radiographic cones, grids and position aids.

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For each area studied, the topics will be presented under the following headings.

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5. Preparation of patient
6. Routine views
7. Supplementary view + modification in cases of trauma
8. Radiation protection
9. Care of patient

For each view studied will be presented as follows:

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2. Immobilisation
3. Identification
4. Centring point
5. Direction of central X-ray relative to the film
6. Parts demonstrated
7. Exposure factor - kVp, mAs, FFD grid/non-grid screen

SPECIALIST PROBLEMS : Where appropriate tutors should refer to the following list of specialist problems, which may arise necessitating technique variations - a) Children and neonates b) Seriously ill or injured patients c) Elder patients d) Deaf and blind patients e) Language difficulties f) Unconscious patients or Anaesthetised patients.

Radiographic Positioning (Technique): From first semester syllabus along with the following additions.

Skull – AP, PA, Lateral, Base of skull, Town’s View, Optic foramen, PNS: Water’s view, Caldwell’s View. Mastoid radiography, Schuller’s view.

Temporomandibular joint.

Dental radiography & dental films.

Portable radiography & ICU radiography.

IMAGING PHYSICS :

1. SCATTER RADIATION & DEVICES TO MINIMIZE

2. HIGH TENSION CIRCUITS : Principles of transformer, transformer design, efficiency of transformer, source of power loss, H.T. generator for x-ray machines, high frequency circuits, self rectifier, half wave rectifier, filament circuit, control of tube current, space charge compensation.

3. METERS : Moving coil galvanometer, construction and working/conversion to milliammeter, ammeter and voltmeter, meters commonly used in diagnostic x-ray machines, pre reading kV meter and milliammeter, digital panel meters.

4. EXPOSURE TIMER : Clockwork timers, synchronous motor timer, electronic timers, photometric timers (fluorescent and photoelectric effect as applied in timers)

5. BASIC PRINCIPLE OF TOMOGRAPHY

6. CABLES (High tension cable)

7. CONSTRUCTION & WORKING AUTO PROCESSOR

3rd SEMISTER B.Sc. (MIT)

PAPER – I

SPECIAL RADIOGRAPHIC POSITIONS

All the views, procedures and technique

Handing of emergency uncooperative patients

1. Scaiphoid view – PA with hand adducted

Anterior oblique – posterior

2. Carpel tunnel view –

3. Skull – AP , PA , lateral

Base of skull view, Town's view

Optic foramen view

4. PNS water's view

5. Caldwell view

6. Mastoid Schuller's view

7. Temporomandibular joint

AP view with closed, open mouth

8. Mandible – AP , lateral & oblique

9. Chest – Lardotic view

10. Cervical spine – Swimmer's view for C7T1

11. Atlanto axial joint – AP, lateral and open mouth

12. Scapula

13. Sternum

Special Investigations in Radio-diagnosis

Procedures

1) **GIT** – Barium procedures

Consent, preparation

Indication

Contraindications & details of procedure

- Ba Swallow, Ba Meal, BMFT, Small bowel enteroclysis, Ba enema

2) **IVU** - Consent

Preparation

Indication

Contraindication
Procedure details
Types of contrast medium used
Contrast media reactions

3) HSG – Consent

Preparation
Indication and Contraindication
Procedure details
Types of contrast medium used and reaction

4) Sialography – Indications and procedures

5) Fistulogram.

6) Contrast media used in Radio diagnosis department. Management of patients with contrast reaction.

PAPER - II CLINICAL SCIENCES

A - GENERAL MEDICINE

1) Principles related to

- Pulse monitoring
- BP monitoring and BP recording
- Temperature monitoring

2) First Aid

3) Maintenance of airway, breathing and circulation

4) In brief role of cardiac monitoring, central venous line, pulse oxymeter, Ryle's tube
intercostals drainage tube and catheters.

1) Care of intubation and tracheostomy.

B) C.V.S.

In brief & Preliminary knowledge about (definition, causes)

1. Hypertension
2. Hypotension, Tachycardia, Bradycases
3. Angina
4. Pulmonary edema

C) RESPIRATORY

In brief & Preliminary knowledge about

(Definition & Radiological Technical & Modalities)

1. Tuberculosis
2. Bronchogenic carcinoma
3. Pneumonia
4. Lung abscess
5. Pleural effusion and empyema
6. Pneumothorax
7. Haemoptosis & main causes.
8. Epitaxis & important causes.

D) G.I.T.

In brief & Preliminary knowledge about

Introduction, pathogenesis and Radiological Technical & Modalities

1. Peptic Ulcer
2. Jaundice
3. Pancreatitis
4. Liver abscess
5. Malignancies –hepatoma ,carcinoma colon , ca.stomach, ca oesophagus
6. Intestinal obstruction
7. Haematemesis & important causes.

E) EXCRETORY SYSTEM

Role and indications of radiological investigations in the below mentioned conditions.

In brief & Preliminary knowledge about

1. Renal failure
2. Hematuria
3. Urinary tract obstruction – clinical features.
 - Calculus
 - Infection

F) SURGERY

Pain in Abdomen, causes and Radiological Technical regarding

1. Renal calculus disease
2. Intestinal obstruction
3. Cholelithiasis
4. Appendicitis
5. Pancreatitis etc
6. Aneurysm

INTRODUCTION, CAUSES AND RADIOLOGICAL TECHNIC PRESENTATION

1. Dysphagia - common causes
2. Ulcer, sinus and fistula
3. Vericose veins and DVT
4. Peripheral vascular disease.

DEFINITION, CAUSES AND OF PRELIMINARY KNOWLEDGE & RADIOLOGICAL TECHNIC

- Pneumoperitoneum
- Ascities
- Hemoptysis
- Malena
- Haematuria
- Patient care and clinical presentation in abdominal trauma
- Tissue biopsy / FNAC
- Entro clysis

CAUSES AND RADIOLOGICAL TECHNIQUE & MODALITIES USED IN CASE OF

- Testicular swelling
- Thyroid swelling
- Breast lump

G) ENT

Role and indications of radiological investigations in the following conditions

Trauma – sites and complications

Tracheostomy indications and uses

Causes and clinical presentation in

- Sinusitis
- Mastoiditis
- DNS
- Tonsillitis
- Foreign body aspiration.

H) ORTHOPAEDICS

Patient care transferring trauma patient esp. with spinal trauma

Role and indications of radiological investigations in the below mentioned conditions

-Fractures – Radiographic positioning.

-Osteomyelitis

-Arthritis

4th SEMISTER B.SC (MIT)

PAPER –I

SPECIAL RADIOGRAPHIC POSITIONS & PROCEDURES

All the views, procedures and technique

Handing of emergency uncooperative patients

Identification of Anatomical parts and their location and technique of imaging.

- 1) Ankle joint AP/ lat.
- 2) Hip Joint with upper third of femur – AP. Lateral & oblique
- 3) Sacro iliac joint – PA & oblique
- 4) Knee joint – intercondylar notch view
- 5) Patella – skyline view
- 6) Foot – Dorsiplantar view
- 7) Pelvimetry.

Angiography - Consent

Preparation

Indication & contraindication.

Procedure.

Types of contrast medium used & reaction.

Radiation Physics & cross sectional anatomy of head.

Principle of radiation protection.

Personal protection from radiation.

Protection from electrical other hazards in radiology department maximum permissible dose (MPD)

RAD, REM

RADIATION PHYSICS & CROSS SECTIONAL ANATOMY OF HEAD, NECK & SUPEX.

A] Technique for imaging and identification of various parts & their location in cross section anatomy of Head, pituitary fossa, Temporal bone, Auditory cannal, Petrus bone etc. various Ventricles.

CROSS SECTIONAL ANATOMY

A] Radiation protection. Radiation protection in C.T. for patient / Technician / Doctor
.maximum

permissible dose, equivalents to various organs and whole body

- Back ground radiation
- Radiation monitoring devices.
Thermoluminescent dosimeter [TLD], Film Badges, Lead apron and lead
equivalent of lead apron.
- Radiation protection devices
- Harmful effects of radiation

A] Local

B] General

- Lethal radiation dose
- Supra lethal radiation dose
- Sublethal exposure
- 10 days rule

C] Genetic effects

- Radiation protection in diagnostic radiology protection surveys.
- Patient protection in radiography
- Personal protection in radiography
- Protection during fluoroscopy
- Dark adaptation

5th SEMISTER B.SC (MIT)

PAPER – I : RADIOGRAPHY & SPECIAL PROCEDURES

I] RADIOGRAPHY OF FOLLOWING PARTS.

- 1) Chest : PA, AP, Decubitoin, Oblique, Apicogram
- 2) Scapula : Oblique, Acromio Clavicular joint
- 3) Cervical spine : oblique for spinal cannal
- 4) Thoracic spine : oblique for spinal cannal
- 5) Skull : AP, Lateral, base of skull, Town's view , cross table, lateral view
- 6) Mandible : oblique
- 7) T.M. joint : open mouth, close mouth
- 8) Wrist : Carpel tunnel view
- 9) Scaphoid view – PA with hand adducted

Anterio posterior

- 10) Skull - Base of skull view
- 11) Skull - Optic canal view
- 12) PNS : water's view
- 13) Caldwell view
- 14) Mastoid Schuller's view.
- 15) Chest – Lardotic view
- 16) Cervical spine – Swimmer's view for C7T1
- 17) Atlanto axial joint – AP, lateral and open mouth
- 18) Sternum

APPLIED PHYSICS :

- I) COMPUTED RADIOGRAPHY
- II) DIGITAL RADIOGRAPHY
- III) PACS

Paper –II - MRI

A] Head, Spine, Joints, Pelvis, Extremities

- MRI Physics- Basic principles.
 - Positioning,
 - Maintenance
 - Knowledge of control keys
 - Protocols used in head and spine joint imaging
 - Knowledge of different sequences used in head and spine
 - Artifacts and remedial measures to be taken.

B] Cross Sectional Anatomy of

- Thorax
- Abdomen.

6th SEMISTER B.SC (MIT)

PAPER- I – RADIOGRAPHY,CR/DR/PACS, ULTRASOUND &

RADIATION PROTECTION.

1. Pelvis : Inlet & outlet view
2. Hip : Joint AP/Lat. - Frog view
3. Sacroiliac joint : Prone / oblique
4. Knee joint : Weight bearing
5. Ankle joint Knee joint – Intercondylar notch view
6. Patella – Skyline view
7. Foot – Dorsiplantar
8. Subtalar Joint – Oblique medial, oblique lateral
9. Foot : Oblique view
10. Abdomen : Cross table
11. Lumber spine : Oblique view for various fascet joints
12. Pelvimetry

- **DR/PACS/CR**

- **Cross sectional Anatomy of Spine.**

Radiation Protection

- Harmful effects of radiation.
- Lead apron etc.

Ultrasound

Ultrasound :- Basic of ultrasound

- Transducers
- Jelly
- Pizzo electric effect
- Care of Ultrasound machine
- Care of Probes.
- How Ultrasound produced etc.
- Trans cranial Ultrasound
- Brief principal of Colour Doppler

- Ultrasound use in ANC
- Role of CT in special procedure
- Mammography
- Role of ultrasound / CT in biopsy.
- Angiography

PAPER – II : CT & MRI ADVANCES & CROSS SECTIONAL ANATOMY OF ABDOMEN &

THORAX.

- MR. Angiography
- MR. Venography
- MRCP, MR Urography
- MR Enteroclysis
- MR guided biopsy
- MR Mammography
- Whole body MRI
- Other applications of MRI

CT HRCT

CT ANGIOGRAPHY,

MDCT

DUAL SOURCE CT

LOW DOSE CT

RECENT ADVANCES

ATTENDANCE

Every candidate should have attended at least 75% of the total number of classes conducted in an academic Term from the date of commencement of the term to the last working day as notified by university in each of the subjects prescribed for that year separately in theory and practical. Only such candidates are eligible to appear for the university examinations in their first attempt.

Special classes conducted for any purpose shall not be considered for the calculation of percentage of attendance for eligibility. A candidate lacking in prescribed percentage of attendance in any subjects either in theory or practical in the first appearance will not be eligible to appear for the university examination in that subject . Failed candidates should have attended at least 75% of the total number of classes conducted in that term in individual subjects separately in theory and practical to become eligible to appear for the university examination in that subject in the supplementary or subsequent examination. however, this is not applicable in case of carryover subjects.

THEORY CLASSES

They will be conducted by the faculty three times in a week. As there are no prescribed books for this course it is advised to the students to take notes during the classes. The teachers have been instructed to provide the notes to students & check them.

CLINICAL POSTINGS

During the first three terms practical hrs will be utilized for radiography positioning of different parts of body. Along with radiography they will also be oriented to ultrasound and radiological special procedures.

From 4th to 6th term practical hrs will be utilized in practicing the positioning for CT/ MRI and performing scanning of different parts of body.

EMERGENCY SERVICES : During Night Hrs.

All the students will be attending the emergency postings along with a trained technician for experience in emergency services. This posting is compulsory for all the students. They will not be permitted to appear for the University examination if this training is not attended in each semester.

INTERNAL ASSESSMENT (IA)

There shall be a periodical tests preferably one in each term in theory and practical of each subject in an academic year. the average marks of the tests will be calculated for internal assessment . In addition to these tests the students attendance , behavior with colleagues and patients will be considered for internal assessment. The marks of IA shall not be communicated to the candidate. Total 200 marks are allotted in each semester for the university practical examinations. Out of these 20 marks will be kept for the internal assessment

If a candidate is absent for one of the tests due to genuine and satisfactory reasons, such a candidate may be given a re-test. Within a fortnight

SCHEDULE OF EXAMINATION

The university shall conduct two examinations annually at an interval of not less than 4 to 6 months as notified by the university from time to time. A candidate who satisfies the requirement of attendance, progress and conduct as stipulated by the university shall be eligible to appear for the university examination. Certificate to that effect shall be produced from the head of the institution along with the application for examination and the prescribed fee. A candidate has to register for all the subjects of a year when he/she appears for the examination of that year for the first time.

SCHEME OF EXAMINATION

There shall be six examinations, one each at the end of 1st , 2nd , 3rd , 4th , 5th and 6th term. Distribution of subjects and marks for university examinations are shown in the Table - The University Examination shall consist of: Written Examination and Practical As this course is practical oriented more marks for practical examination have been allotted.

FIRST TERM

Sl. No.	Subject	Written examination	Practical examination	Total Marks
1	Basic Sciences	50 Marks	100 Marks	150 Marks
2	Imaging Physics & Radiographic positioning	50 Marks	100 Marks	150 Marks

SECOND TERM

Sl. No.	Subject	Written examination	Practical examination	Total Marks
1	General Pathology, Microbiology, Forensic Medicine.	50 Marks	100 Marks	150 Marks
2	Imaging Physics & Radiographic positioning	50 Marks	100 Marks	150 Marks

THIRD TERM

Sl. No.	Subject	Written examination	Practical examination	Total Marks
1	Radiological Procedures & Radiography	50 Marks	100 Marks	150 Marks
2	Clinical & Para Clinical Sciences Medicine , Orthopaedics , Surgery, ENT	50 Marks	100 Marks	150 Marks

FOURTH TERM

Sl. No.	Subject	Written examination	Practical examination	Total Marks
1	Special Radiographic Positions & Procedures	50 Marks	100 Marks	150 Marks
2	Radiation Physics and Cross Sectional anatomy, Head, Neck and Joints	50 Marks	100 Marks	150 Marks

FIFTH TERM

Sl. No.	Subject	Written examination	Practical examination	Total Marks
1	Radiography & Special Procedures (Digital radiography,	50 Marks	100 Marks	150 Marks
2	Physics of imaging sciences (MRI,CT,USG)	50 Marks	100 Marks	150 Marks

SIXTH TERM

Sl. No.	Subject	Written examination	Practical examination	Total Marks
1	Radiography, Digital radiography, PACS, CR Cross sectional anatomy of Spine, Ultrasound.	50 Marks	100 Marks	150 Marks
2	Cross sectional anatomy of abdomen & Thorax. Advances in CT & MRI.	50 Marks	100 Marks	150 Marks

CRITERIA FOR PASS

Candidates are declared to have passed in a subject, if they secure 50 % marks in the university examination.

Theory & Practical shall be considered as separate subjects.

If a candidate passes in practical examination but fails in theory examination, such candidate is exempted from reappearing for practical but shall have to appear in the subsequent examination for the theory paper in which the candidate has failed or vice versa.

GRACE MARKS

5 grace marks are allotted to a candidate, for each semester examination to pass the subject either in theory or practical, or in both; provided he is passing in the other subject (Theory & Practical)

DECLARATION OF CLASS

A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 75% of marks or more of grand total marks prescribed will be declared to have passed the examination with distinction.

A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 60% of marks or more but less than 75% of grand total marks prescribed will be declared to have passed the examination in first class.

A candidate having appeared in all the subjects in the same examination and passed that examination in the first attempt and secures 50% of marks or more but less than 60% of grand total marks prescribed will be declared to have passed the examination in second class.

A candidate passing a university examination in more than one attempt shall be placed in pass class irrespective of the percentage of marks secured by him/her in the examination

GRADING SYSTEM

The grading system is as follows: Distinction: 75% and above First class: 65% and above Second class: 50% and above Pass: 50% Fail: Below 50%

CARRY OVER BENEFIT

A candidate should pass all the subjects of first semester, to enter into third semester. Similarly second semester subjects should be cleared before entering fourth semester. Third semester subjects should be cleared before entering fifth semester.

If a candidate has failed in 1st semester, he can join second semester and attend the classes .He will have to clear all the subjects of first semester before he joins the third semester.

Similarly second semester subjects should be cleared before entering fourth semester. Third semester subjects should be cleared before entering fifth semester.

However the candidate must have passed all previous subjects to appear for the sixth semester university examination.

BOARD OF EXAMINERS

Practical Examination Will Be Conducted By 2 Examiners Out Of Which One Will Be External Examiner Recognized By The University For The Above Purpose, Preferably From Outside The City Limits.

Maximum Duration For Completion of Course

A candidate shall complete the course within seven years from date of admission. Failing which the candidate will be discharged.

AWARD OF DEGREE

Eligibility for the award of degree

A Candidate Shall Have Passed In All The Subjects Of First, Second And Third Year To Be Eligible For Award Of Degree

INTERNSHIP

A student after having successfully completed the final year university examination is qualified to commence the Compulsory Rotatory Internship. The completion of Internship is mandatory to enable a student to obtain the degree of Bachelor of Medical Imaging Technology. The duration of internship is 6 months.