

STAREX UNIVERSITY

Master of Vocation (Radiology and Medical Imaging Technology)

M. Voc. (RMIT)

Study & Evaluation Scheme of Master of Vocation in Radiology and Medical Imaging Technology (M. Voc. RMIT)

Programme: Master of Vocation in Radiology and Medical Imaging Technology (M. Voc. RMIT)

Duration: Two year (04 Semester) full time programme

Medium: English

Master of Vocation (Radiology and Medical Imaging Technology) M. Voc. (RMIT) Syllabus Year 1 (Degree)

I Semester				
S.No.	Course Code	Subject	Content Type	Credit
1	MVRMIT-101	Radiographic Procedures	Skill	4
2	MVRMIT -102	Instrumentation of Conventional Radiology equipments.	Skill	4
3	MVRMIT -103	Principles of Radio Graphic Exposure	Skill	4
4	MVRMIT-104	Fluoroscopy	Skill	4
5	MVRMIT-105	Business Communication	Gen	4
6	MVRMIT-106	Human Anatomy & Physiology	Gen	4
7	MVRMITP-1	Vocational Practical or Clinical Posting	Skill	18

II Semester				
S.No.	Course Code	Subject	Content Type	Credit
1	MVRMIT-201	Patients Care In Diagnostic Radiology	Skill	4
2	MVRMIT-202	Radiation Evaluation And Protection In Diagnostic Radiology	Skill	4
3	MVRMIT-203	Interventional Radiology Technique	Skill	4
4	MVRMIT-204	Nuclear Medicine & Imaging Techniques	Skill	4
5	MVRMIT-205	Research Methodology	Skill	4
6	MVRMITP-2	Vocational Practical or Clinical Posting	Skill	6

**Master of Vocation (Radiology and Medical Imaging Technology)
M. Voc. (RIT) Syllabus
Year 2 (Degree)**

III Semester				
S.No.	Course Code	Subject	Content Type	Credit
1	MVRMIT-301	Basic Electronic And Biostatistics	Gen	4
2	MVRMIT-302	Advanced Techniques And Instrumentations Of CT	Gen	4
3	MVRMIT-303	Instrumentations Of Specialized Radiology Equipments	Gen	4
4	MVRMIT-304	Basic & Advanced Ultrasonography	Skill	4
5	MVRMIT-305	Digital Radiography	Skill	4
6	MVRMIT-306	Corporate Communication	Skill	4
7	MVRMITP-304	Vocational Practical or Clinical Posting	Skill	18

IV Semester				
S.No.	Course Code	Subject	Content Type	Credit
1	MVRMIT-401	Modern Imaging Equipments	Skill	4
2	MVRMIT-402	Advanced Techniques And Instrumentation Of MRI	Skill	4
3	MVRMIT-403	Echocardiography	Skill	4
4	MVRMIT-404	Radiology Department Administration	Skill	4
5	MVRMIT-405	Radiation Hazards & Safety	Skill	4
6	MVRMIT-4	Vocational Practical (Thesis + viva)	Skill	18

M. Voc. RMIT -I Semester

PAPER: 1 - Course/ Paper: Radiological Procedure

Course Code: RMIT 101

Objectives:

1. To know management and positioning of patients while performing radiological procedures.
2. Knowledge of indications, contraindications, contrast media, radiation dose, exposure timing and radiation safety measures for different radiological procedures.
3. To understand the patient preparations needed before any radiological examination.
4. Knowledge of post procedural care.

Skills:

1. Knowledge of image quality in radiological images.
2. Students will be able to position the patients for radiological procedures.
3. Management of patients in radiology department for various procedures.
4. Ability to handle emergency situations in radiology department.
5. Precautions and care required in interventional suits.

UNIT 1:

Contrast Media – Applications, types, safety aspects, mode and volume of administration, administration techniques

Digestive system: -

Anatomy and physiology

Associated pathology and radiographic appearance

Barium swallow

Barium meal

Barium meal follow through

Enteroclysis

Barium enema

Geneto Urinary System: -

Anatomy and physiology
Associated pathology and radiographic appearance
Intravenous urogram (IVU)
Micturating cystourethrogram (MCU)
Ascending urethrogram (ASU)
Hysterosalpingography (HSG)
Fallopian tube recanalisation (FTR)
Retrograde urethrogram (RGU)

NIT 2

Cardio-respiratory system:

Anatomy and physiology
Associated pathology and radiographic appearance
Bronchography
Percutaneous lung biopsy

Mammography:

Anatomy and physiology
Indications, Contra Indications and special views
ICRP guidelines, BIRADS

UNIT 3:

Skull:

Related anatomy of facial and cranial bones
Associated pathology and radiographic appearance
Indications, Contra Indications and special views

Vertebral Column:

Related anatomy
Associated pathology and radiographic appearance
Indications, Contra Indications and special views

Upper limb:

Related anatomy

Associated pathology and radiographic appearance

Indications, Contra Indications and special views

Lower limb:

Related anatomy

Associated pathology and radiographic appearance

Indications, Contra Indications and special views

UNIT 4:

Pelvis:

Related anatomy of pelvic bones and hip joint

Associated pathology and radiographic appearance

Indications, Contra Indications and special views

Hepatobiliary System:

Related anatomy

Associated pathology and radiographic appearance

ERCP/PTBD, T-Tube cholangiography, PTC

UNIT 5:

Dental Radiography:

Related anatomy

Associated pathology and radiographic appearance

OPG

Cephalometry

Additional Procedures:

Related anatomy

Associated pathology and radiographic appearance

Arthrography, Sialography, dacrocystography, sinography, fistulography

Practicals:

Contrast Media Digestive system

Geneto Urinary System Cardio-respiratory system Mammography

Skull

Vertebral Column Upper limb

Lower limb Pelvis
Hepatobiliary System
Dental Radiography
Other Procedures

PAPER: 2 - Instrumentation of Conventional X Ray Equipments

Course Code: RMIT 102

Objectives:

1. To understand the general physics related to Medical imaging technology.
2. Construction and working of Equipments used in x- ray.
3. Application of Equipments in Medical Imaging Technology.

Skills:

- 1) Knowledge of basic physics associated with radiology.
- 2) Students will be able to understand the construction and equipment description of X-ray, fluoroscopy and mammography.
- 3) Maintenance and care of x-ray Equipments used in radiology departments.
- 4) Quality control of radiology Equipments.

Unit 1:

Generation of electrical energy
Distribution of electrical energy
Uses of electricity in hospitals
Safety rules for technologist

UNIT 2:

X ray circuit components
High tension transformers
Main voltage compensation
High tension switches
Stabilizers and UPS

UNIT 3:

Fuses
Switches
Earthing

High tension cables constructions and design

Rectifications

Types of rectifiers

Transformers and its types

Tube rating

Types of generators

UNIT 4:

Switches

Circuit breakers

Exposure switching and its application

Magnetic relay

Thermal relay switches

Interlock in tube circuit and over load inter interlocks

UNIT 5:

Exposure Timers

Timing systems

Electronic timer

Ionization timer

Photo timer

Synchronous timer and impulse timer

PRACTICALS:

Uses of electricity in health care centres

Safety rules for technologist X ray circuit components

High tension transformers

Main voltage compensation

High tension switches

Stabilizers and UPS Fuses

Switches Earthing

Exposure Timers

Timing systems

Electronic timer

Objectives:

1. To know basic physics of radiography
2. Construction and working of film, intensifying screen, cassette, dark room, computed radiography, direct radiography, automatic processor.
3. To understand radiographic film Processing chemistry.
4. To study the factors affecting image quality in radiographic image and their application.

Skills:

- 1) Students will be able to manage the workflow in x-ray imaging.
- 2) Knowledge of improving image quality in radiographic images.
- 3) Appropriate knowledge for the use of radiation factors.
- 4) Students will be able to process the radiographic film in different systems, eg: dark-room, CR, DR and automatic processor.
- 5) Ability for the care and maintenance of radiographic films, cassettes, intensifying screens, darkroom accessories and X-ray equipment.

Unit 1:

X ray production
Interaction of radiation with matter
Useful range
Clinical application
The Photographic Process
Basic review of photographic emulsion
Photographic latent image
Film materials
Speed and contrast of photographic material
Intensifying screens and cassettes
Film processing

UNIT 2:

Sensitometry
Photographic density
Opacity

Transmission

Production of characteristic curve

Features of characteristic curve

Variation in the characteristic curve with development

Comparison of emulsion by their characteristic curve

Application of characteristic curve

Information from the characteristic curve

UNIT 3:

Radiographic image

Radiographic density

Acceptable range

Factors influences density

Radiographic contrast

Components

Factors influence contrast

Management of radiographic image quality

UNIT 4:

Resolution

Line spread function & modulation transfer function

Unsharpness in the radiographic image and various factors contributing towards unsharpness

Types of unsharpness

Radiographic mottle

Geometry of the radiographic image

Magnification / distortion – types and factors

UNIT 5:

Instrumentation of processing equipment

Automatic film processor (AFP)

Layout and planning of dark room

Viewing accessories: viewing boxes

Magnifiers and viewing conditions

PRACTICALS:

X ray production

Interaction of radiation with matter Film materials

Speed and contrast of photographic material Intensifying screens and cassettes

Film processing

Radiographic image Radiographic density Acceptable range

Factors influences density

Layout and planning of dark room

Viewing accessories: viewing boxes Magnifiers and viewing conditions

PAPER: 4 – Clinical Posting

Course Code: RMITP 104

Practicals of all the learnt theories.

M. Voc. RMIT -II Semester

PAPER: 1 - Patients Care in Diagnostic Radiology

Course Code: RMIT 201

Objectives:

1. To know the basic needs and care for the patients inside the radiology departments.
2. Preparation of patients for various radiological examinations.
3. Knowledge of the transferring patients before and after the radiological examination and restraining of patients at the time of examination.

Skills:

- 1) Students will be able to transfer the patients without causing any complications and can restrain the uncooperative patients during radiological examinations.
- 2) Obtaining vital signs, handling equipments used for various procedures.
- 3) Management and Care of patient during emergency situations.
- 4) Using sterilised techniques to reduce the chances of infection in work practices.

Unit 1:

Introduction to the patient care
Responsibility of the health care facility
Responsibilities of the Imaging technologist
General patient care
Patient transfer technique
Restraint technique
Aspects of patient comfort
Specific patient conditions
Security of the patient property
Obtaining vital signs
Laying up a sterile trolley
IV injection administration

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UNIT 2:

Nursing procedure in radiology
General abdominal preparation
Clothing of the patient
Giving an enema
Handling the emergencies in radiology
First aid in the x ray departments

UNIT 3:

Patient care during investigation
GI tract, biliary tract, respiratory tract, gynecology, cardiovascular, lymphatic system, C N
S. etc.

UNIT 4:

Infection control
Isolation technique
Infection source
Transmission modes
Procedures'
Psychological considerations
Sterilization & sterile technique

UNIT 5:

Patient education
Communication
Patient communication problems
Explanation of examinations
Radiation safety/ protection
Interacting with terminally ill patient
Informed consent

PRACTICALS:

Introduction to the patient care
Responsibility of the health care facility

Responsibilities of the Imaging technologist Aspects of patient comfort

Specific patient conditions

Security of the patient property Obtaining vital signs

Laying up a sterile trolley IV injection administration Giving an enema

Handling the emergencies in radiology First aid in the x ray departments

Nursing procedure in radiology General abdominal preparation Infection control

Isolation technique Patient education Communication

Patient communication problems Explanation of examinations

Radiation safety/ protection

PAPER: 2 - Radiation evaluation and Protection in Diagnostic Radiology

Course Code: RMIT 202

Objectives:

1. Knowledge of radiation protection principles and their application in radiology department.
2. Knowledge of departmental layouts for protection of patients, occupational workers and general public.

Skills:

- 1) Protecting the patients, occupational workers and general public from secondary radiation.
- 2) Regulation of radiation practices according to internationally accepted methods.
- 3) Obtaining, handling equipments used for various procedures.

UNIT 1:

Introduction to Radiation Protection

Need for Protection

Aim of Radiation Protection

Basic radiation units and qualities

Exposure

Absorbed

Absorbed dose equivalent

Quality factor

Tissue weighting factor

UNIT 2:

Limits of Radiation exposure

Concept of ALARA (or ALARP)

ICRP regulation

Maximum permissible dose

Exposure in pregnancy, children

Protection in Diagnostic Radiology

Protection for primary radiation

Work load

Use factor

Occupancy Factor

Protection in scatter Radiation and leakage radiation

X-Ray room design

Structural shielding

Protective devices

Radiation signages

UNIT 3:

Technical protective considerations during Radiography

Evaluation of hazards

Effective communication

Immobilization

Beam limiting devices

Filtration

Exposure factors

Protection in

Fluoroscopy

mammography

mobile radiography

CT scan

Angiography room

UNIT 4:

Radiation measuring instruments

Area monitoring

Personals dosimeters

Film badge

Thermo luminescent dosimeter

Pocket dosimeter

UNIT 5:

Biological aspects of Radiological protection

Biological effects of radiation

Direct and indirect actions of radiation

concept of detriment-Documentation and stochastic effect of radiation-somatic and general effects

Dose relationship

Effects of antenatal exposure

PRACTICALS:

Introduction to Radiation Protection Need for Protection

Aim of Radiation Protection

Exposure in pregnancy, children

Protection in Diagnostic Radiology Protection for primary radiation

Protective devices

Radiation signages Protection in

Fluoroscopy

Mammography

mobile radiography

CT scan

Angiography room

Personals dosimeters

Film badge

Thermo luminescent dosimeter

Pocket dosimeter

Radiation measuring instruments Area monitoring

Biological aspects of Radiological protection Biological effects of radiation

Direct and indirect actions of radiation

PAPER: 3 - Interventional Radiology Techniques

Course Code: RMIT 203

Objectives:

1. To know management and positioning of patients while performing interventional radiological procedures.
2. Knowledge of indications, contraindications, contrast media, radiation dose, exposure timing and radiation safety measures for different interventional radiological procedures.
3. To understand the patient preparations needed before any interventional radiological examination.
4. Knowledge of post procedural care.

Skills:

1. Management of patients in radiology department for various procedures.
2. Knowledge of image quality in interventional radiological images.
3. Precautions and care required in interventional suits.

Unit 1:

Introduction

Need for interventional procedures

DSA:

Basic principle

Types

Equipments:

Basics of angiographic equipments

Single and biplane angiographic equipments

Angiographic table

Image intensifier

Flat panel detectors

Pulseoximetry

Cardiac resuscitation measure - ECG

Pressure injector

Catheters, needles & other tools

3D rotational angiography

Image processing

Patient monitor

UNIT 2:

Patient care:

Preparation for procedure

Post procedure care

Role of radiographer in interventional procedure

Crash trolley – Emergency drugs

UNIT 3:

Procedures:

Diagnostic & therapeutic interventional procedures

PTC, PTBD, Stenting

Nephrostomy, ureteric stenting

Guided biopsies of different organs

Drainage of collections / abscesses

Angiograms, angioplasty, embolization

Venous access

Radiofrequency ablation

UNIT 4:

- Neuro interventional procedures
- Embolization of extra or intracranial tumors, vascular malformations
- Vetebroplasty – direct puncture
- Laser guided procedure
- Basics of cardiac catheterization
- Safety considerations in angiography room
- Room design
- Protective devices
- Radiation monitoring

UNIT 5:

- Care, maintenance and tests:
 - General care
 - Functional tests
- Quality assurance program:
 - Acceptable limits of variation
 - Corrective action

PRACTICALS:

- Basics of angiographic equipments
- Single and biplane angiographic equipments
- Angiographic table
- Image intensifier
- Flat panel detectors
- Pulseoximetry
- Cardiac resuscitation measure - ECG Pressure injector
- Catheters, needles & other tools
- 3D rotational angiography

Preparation for procedure

Post procedure care

Role of technologist in interventional procedure

Diagnostic & therapeutic interventional procedures PTC, PTBD, Stenting

Nephrostomy, ureteric stenting

Guided biopsies of different organs

Drainage of collections / abscesses

Angiograms, angioplasty, embolization Venous access

Radiofrequency ablation

Image guided nerve blocks

Neuro interventional procedures

Embolization of extra or intracranial tumors, vascular malformations

Vertebroplasty – direct puncture

PAPER: 4 – Clinical Posting

Course Code: MVRMITP 204

Practicals of all the learnt theories

M. Voc. RMIT -III Semester

PAPER: 1 – Basic Electronics and Bio- Statistics

Course Code: RMIT 301

Course Description: Introduction to Basic Statistical Concepts: Methods of Statistical Analysis; And Interpretation of Data

Behavioural Objectives:

- Understands Statistical Terms.
- Possess Knowledge and Skill in the use of Basic Statistical and Research Methodology.

UNIT 1:

Introduction

Introduction to biostatistics & research methodology, mean, median, mode, standard deviation, types of variables & scales of measurements, measure of central tendency & dispersion, rate, ratio, proportion, incidence & prevalence, correlation and regression.

UNIT 2:

Sampling

Random and non random sampling, different sample techniques – simple random, stratified, systematic, cluster & multistage. Sampling and non sampling errors and methods of minimizing these errors

Sampling distributions. Statistics and parameter. Standard error. Basic probability distributions - Normal, poisson, binomial distributions with their applications in biological sciences.

UNIT 3:

Tests of significance

Basics of testing of hypothesis – Null & Alternative hypothesis, type I and type II errors, level of significance (parametric) & power of the tests, p value. Tests of significance – T test (paired & unpaired), Chi square test & Test of proportion, One way analysis of variance . Repeated measures analysis of variance. Tests of significance (non parametric) – Mann – Whitney U Test, Wilcoxon Test, Kruskal – Wallis Analysis of variance, Friedmann's Analysis of variance

UNIT 4:

Sample size determination

General concept. Sample size for estimating means and proportion, testing of difference in means and proportions of two groups.

Study designs

Descriptive epidemiological methods – case series analysis and prevalence studies .

Analytical epidemiological methods – case control and cohort studies. Clinical trials / intervention studies, odds ratio and relative risk , stratified analysis

UNIT 5:

Reliability and validity of diagnostic tests

Format of scientific documentations

Structure of research protocols, structure of thesis/research report, formats of re[porting in scientific journals. Systematic review and meta analysis.

Electricity (AC, DC), Resistors, Capacitors, Circuits, Diodes, Resistance, Transistors, Switches and Circuit breakers.

PAPER: 2 – Advanced Technique and Instrumentation of Computed Tomography

Course Code: RMIT 302

Objectives:

1. To know basic principle and physics of CT scan.
2. Protocols needed for CT examination.
3. Preparation and positioning for CT examination.
4. Post processing of raw CT images.

Skills:

- 1) Students will be able to prepare and position the patients for CT examination.
- 2) Knowledge of improving image quality in CT images.
- 3) Scanning of patient with various CT protocols for better representation of images.

- 4) Post processing for CT scan data eg: volume rendering, surface shaded display, multi planar reconstruction, maximum intensity projection, curved linear projections.

- 5) Management of patient for any post contrast reactions.

Unit 1:

Imaging principles in computed tomography
Instrumentation of CT scan
Advances in detector technology
Slip ring technology
Helical CT
Single slice and multi slice scan CT system

UNIT 2:

Image display
Pre and post processing techniques
Image quality in single slice and multi slice helical CT scan
Dose reduction techniques
CT dosimetry

UNIT 3:

Protocol for adult whole body CT
Protocols for paediatric whole body CT
Documentation
CT Artefacts

UNIT 4:

CT angiography
CT fluoroscopy
CT perfusion scanning
Dentascan
Ct colonoscopy

CT bronchoscopy
CT coronary angiography

CT calcium scoring

UNIT 5:

Care maintenance and tests

General care

Functional tests

Quality assurance program

Acceptable limits of variation

Corrective action

PRACTICALS:

Protocol for adult whole body

CT Protocols for paediatric whole body

CT Documentation

CT Artefacts

CT angiography

CT fluoroscopy

CT perfusion scanning

Dentascan

CT colonoscopy

CT bronchoscopy

CT coronary angiography

CT calcium scoring

PAPER: 3 – Instrumentation of Specialized Radiology Equipments

Course Code: RMIT 303

Objectives:

1. To understand the general physics related to Medical imaging technology.
2. Construction and working of Equipments used in x- ray and fluoroscopy.
3. Application of Equipments in Medical Imaging Technology.

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Skills:

1. Students will be able to understand the construction and equipment description of X-ray, fluoroscopy and mammography.
2. Knowledge of basic physics associated with radiology.
3. Maintenance and care of x-ray Equipments used in radiology departments.
4. Quality control of radiology Equipments.

Unit 1:

Portable x ray equipments
Mobile x ray equipments
Capacitor discharge mobile equipment
Cordless mobile equipments
X ray equipments for the operating theatre

UNIT 2:

Fluoroscopy equipments
Construction and working principles of image intensifier
Viewing the intensified image
Recording the intensified image
Digital fluoroscopy
Panel type image intensifier

UNIT 3:

Fluoroscopy/radiographic tables
General features of fluoroscopy / radiographic tables
The serial changer
Remote control table
The spot film devices

UNIT 4:

Computerized Radiography
Digital Radiography
Equipment for cranial and dental radiography
General dental x ray equipment

Pantomography equipment

Equipment for mammography

UNIT 5:

Care, maintenance and tests

General care

Functional tests

Quality assurance programme

Acceptable limits of variation

Corrective action

PRACTICALS:

Portable x ray equipments

Mobile x ray equipments

Capacitor discharge mobile equipment

Cordless mobile equipments

X ray equipments for the operating theatre

Fluoroscopy equipments

Construction and working principles of image intensifier

Viewing the intensified image

Recording the intensified image

Digital fluoroscopy

Computerized Radiography Digital Radiography

PAPER: 4 – Clinical Posting

Course Code: MVRMITP 304

Practicals of all the learnt theories

M. Voc. RMIT –IV Semester

PAPER: 1 –Advanced Techniques & Instrumentation of Ultrasound

Course Code: RMIT 401

Objectives:

1. To know basic principle and physics of ultrasonography.
2. Preparation of patient for sonographic.
3. Recognizing the artefacts associated with ultrasonography.
4. To learn the measures for improving image quality in ultrasonography.

Skills:

- 1) Students will be able to prepare and position the patients for ultrasonography
- 2) Knowledge of improving image quality in ultrasonography.
- 3) Scanning of patient with various ultrasonography protocols for better representation of images.
- 4) Post processing for ultrasonography data

UNIT 1:

Ultrasound:

Properties of ultrasound

Interaction of ultrasound with matter

Transducers

Types of transducers

Advances in the design of modern ultrasound transducers

UNIT 2:

Image display

Display modes

ultrasound instrumentation controls

Image storage

Scan converter memory

Photographic film

Multi format camera

Laser imager
Colour and video thermal printer
Computer storage
Pre and post processing techniques

UNIT 3:

Doppler imaging

Doppler principles
Continuous wave Doppler and pulsed Doppler
Duplex scanning
Colour flow imaging
Power Doppler
Harmonic imaging
Extended field of view

UNIT 4:

Ultrasound contrast agents
Image characteristics and artefacts
Vascular, interventional, intraoperative and ophthalmic ultrasonography
3D and 4D ultrasound imaging

UNIT 5:

Bio – effects and safety consideration in ultrasound
Ultrasound system performance measurements
Ultrasound equipments quality assurance – conventional & Doppler system testing
& documentation
Ultrasound protocols

PRACTICALS:

Ultrasound:

Properties of ultrasound
Interaction of ultrasound with matter

Transducers:

Types of transducers

Advances in the design of modern ultrasound transducers

Laser imager

Colour and video thermal printer

Computer storage

Pre and post processing techniques

Doppler principles

Continuous wave

Doppler and pulsed

Doppler Duplex scanning

Colour flow imaging

Power Doppler

Harmonic imaging

Extended field of view

Vascular, interventional, intraoperative and ophthalmic ultrasonography

3D and 4D ultrasound imaging

Ultrasound protocols

PAPER: 2 - Advanced Techniques & Instrumentation of MRI

Course Code: RMIT 402

Objectives:

1. To know basic principle and physics of MRI scan.
2. Protocols needed for MRI examination.
3. Preparation and positioning for MRI examination.
4. Post processing of raw MRI images.

Skills:

- 1) Students will be able to prepare and position the patients for MRI examination.
- 2) Knowledge of improving image quality in MRI images.
- 3) Scanning of patient with various MRI protocols for better representation of images.

- 4) Post processing for MRI scan.
- 5) Management of patient for any post contrast reactions.

UNIT 1:

Basic principles

Spin

Precession

Relaxation time

Pulse cycle

T1 weighted image

T2 weighted image

Proton density image

UNIT 2:

MR instrumentation

Types of gradients

RF transmitter and receiver coils

Gradient coils

Shim coils

RF shielding

Computers

UNIT 3:

Pulse sequence

Spin echo pulse sequences – turbo spin echo pulse sequences

Gradient echo sequence – turbo gradient echo pulse sequence

Inversion recovery sequence - STIR sequence, SPIR sequence, FLAIR sequence

Echo planar imaging & Fast imaging sequences

Advanced pulse sequences

Image formation

2D Fourier transformation method

K space representation

3D Fourier imaging

MIP

UNIT 4:

MR contrast media

MR angiography – TOF & PCA

MR spectroscopy

Protocols in MRI for whole body

MRI artefacts

Safety aspects in MRI

UNIT 5:

Cardiac MRI

Musculoskeletal imaging protocols

Abdominal imaging protocols

Functional imaging techniques

BOLD imaging

Care, maintenance & tests

General care

Functional tests

Quality assurance programme

Acceptable limits of variation

Corrective action

PRACTICALS:

Basic principles

RF transmitter and receiver coils

Gradient coils

Shim coils RF shielding

Spin echo pulse sequences – turbo spin echo pulse sequences

Gradient echo sequence – turbo gradient echo pulse sequence

Inversion recovery sequence - STIR sequence, SPIR sequence, FLAIR sequence

MR contrast media

MR angiography – TOF & PCA MR spectroscopy

Protocols in MRI for whole body

MRI artefacts

Safety aspects in MRI Cardiac

MRI Musculoskeletal imaging protocols

Abdominal imaging protocols

Functional imaging techniques

BOLD imaging

PAPER: 3 - Nuclear Medicine Imaging Techniques

Course Code: RMIT 403

Objectives:

1. To know basic principle and physics of nuclear medicine.
2. Preparation of patient for nuclear medicine examination.
3. Preparation and precautions while handling radiopharmaceuticals.
4. Recognizing the artefacts associated with nuclear medicine.
5. To learn the measures for improving image quality in nuclear medicine.

Skills:

1. Students will be able to prepare and position the patients for nuclear medicine examination.
2. Knowledge of improving image quality in nuclear medicine.
3. Scanning of patient with various nuclear medicine protocols for better representation of images.
4. Post processing for nuclear medicine data
5. Management of patient for any late reactions associated with radiotracers in nuclear medicine.

UNIT 1:

Basic atomic and nuclear physics
Quantities activity
Atomic composition and structure
Nucleus composition
Radioactivity
Exponential decay
Specific activity
Parent/Daughter decay
Modes of Radioactive decay

UNIT 2:

Radiation detectors

Gas filled detectors-Basic principles

Ionization chambers

Proportional counters

Geiger Muller counters

Semiconductor detectors

Scintillation detectors-basic principles

UNIT 3:

Production of radio nuclides

Reactor produced radio nuclide

Reactor principles

Accelerator produced radionuclide

Radionuclide generators

Instrumentation

Basic principles

System components

Detector systems and electronics

Collimators

Image display a recording system

Scanning cameras

Radio pharmacy

Radiopharmaceuticals

General principles of tracer technique

Preparation of different labeled compounds with technetium-99m isotope

Cold kits

UNIT 4:

In vivo technique

Static and dynamic studies

Thyroid imaging

Imaging of bone

Respiratory system

Urinary system

G.I system

Cardiovascular system

Iodine 131 uptake studies

Iodine 131 therapy of thyrotoxicosis and thyroid ablation

UNIT 5:

SPECT imaging

PET imaging

Radiation safety in nuclear medicine

Radiation units quantities

MPD

Safe handling of radioactive materials

Storage of radioactive materials

Procedures for handling spill

Disposal of radioactive waste

Radiation monitoring

Survey meters

Personnel dosimeters

Wipe testing

Contamination monitor

Isotope calibrator

Area monitor

Inventory of isotopes

DISSERTATION:

Eligibility to be a guide

Shall be a full time teacher in the college or institution he or she is working.

Viva- voce: -

ETHICS IN M. Voc. RMIT TECHNOLOGY

Introduction: With the advances in science and technology and the increasing needs of the patient, their families and community, there is a concern for the health of the

community as a whole. There is a shift to greater accountability to the society. It is therefore absolutely necessary for each and every one involved in the health care delivery to prepare them to deal with these problems. Technicians like the other professionals are confronted with many ethical problems.

Standards of professional conduct for technicians are necessary in the public interest to ensure an efficient laboratory service. Every technician should not only be willingly to play his part in giving such a service, but should also avoid any act or omission which would prejudice the giving of the services or impair confidence, in respect, for technician as a body.

To accomplish this and develop human values, it is desired that all the students undergo ethical sensitization by lectures or discussion on ethical issues.

Introduction to ethics-

What is ethics?

General introduction to Code of RMIT Ethics

How to form a value system in one's personal and professional life? International code of ethics

Ethics of the individual- Technician relation to his job Technician in relation to his trade
Technician in relation to medical profession Technician in relation to his profession.

Professional Ethics-

Code of conduct

Confidentiality

Fair trade practice

Handling of prescription

Mal practice and Negligence Professional vigilance

Research Ethics-

Animal and experimental research/ humanness Human experimentation

Human volunteer research - informed consent Clinical trials

Gathering all scientific factors Gathering all value factors

Identifying areas of value – conflict, setting priorities

Working out criteria towards decision

ICMR/ CPCSEA/ INSA Guidelines for human / animal experimentation