Syllabus -Radio imaging technician (X-ray,USG, C.T.Scan,MRI,DSA)

First Year-

Principles Of Radiation Production, Detection And Measurement:

Gas-Filled Detectors (Ionization Chambers, Proportional Counters And Geiger Muller Counters) Scintillation Detectors, Thermoluminescent Dosimeters (Tld). Reasons For Choice Of AirIonization. Roentgen And Rad. Simple Principles Of Dosimeters.

Biological Effects Of Radiation : Chemical Effects Of Radiation - Radiolysis Of Water ; Production Of Free Radicals, Radicals Reactions, G-Valve. Effects Non-Stochastic Effects, Chromosome Aberrations And Mutations. Radiation Effects On Whole Body (Early Effects And Late Effects). Concept Of Doubling Dose. Risk Factors.

Radiation Protection: Principle Of Radiation Protection - Historical Development, Maximum Permissible Exposure Concept ; Annual Dose Equivalent Limits (Adel) A.L.A.R.A.(As Low As Reasonably Achievable) Concept ; International Recommendations And Current Code Of Practice For The Protection Of Persons Against Ionizing Radiation's From Medical And Dental Use.

Protective Materials: Lead, Lead - Impregnated Substances, Building Materials, Concept Of Barriers, Lead Equivalents And Variations With Quality. Design Of X-Ray Tubes Related To Protection. Structural Shielding Design (Work-Load, Use Factor, Occupancy Factor, Distance) Departmental Protection. Radiation Protection Of Staff Members, Patients And Public. Protection Instruments & Personnel And Area Monitoring.

Suggested Books For Reference: Farr RF & Allisy-Roberts PJ : Physics for Medical Imaging (Saunders-An imprint of Elserier) 1st Edition 2006

SECTION B- **Medical Physics**

Switching And Timing: Exposure Timers, Spring Activated, Synchronous, Electronic, Auto Timers, Exposure Switching -Mechanical Contactors, Electronic Switching In Low Tension And High Tension Circuits. Interlocking Circuits - Use Of Relays, Tube Overload Protection. Circuit Diagrams - Simple Circuit Diagrams As Illustration Of Sequence From Mains Supply To Controlled X-Ray Exposures, Block Diagrams.

X-Ray Tubes: Rotating Anode X-Ray Tubes, Design, Rating, And Use Of Rating Charts, Care Of The X-Ray Tubes; Inherent Filtration And Additional Filtration; Practical Considerations In The Choice Of Focus; Speed Of Anode Rotation; Angle Of Anode Inclination. Grid-Controlled X-Ray Tube.

Control of Scattered Radiations: Cones, Tube Diaphragms,. Single And Multileaf Grids, Structure And Materials; Grid Ratio And Lines /Cm. Parallel And Focussed Grids, Stationary Grids, Crossed Hatched Grids. Gridded Cassettes, Grid Movements, Potter-Bucky Diaphragms ; Single Stroke, Reciprocating And Oscillating Mechanisms; Beam Centring Devices - Centre Finders, Optical Centring Devices, Light Beam Collimators.

Equipments: I Fluoroscopy and Image Intensifiers: Direct Fluoroscopy, Fluoroscopy Image, Fluoroscopic Screen, Explorators (Serial Changers, Spot Film Devices) And Accessories. Radiation Protection Including Integrating Timer. Tilting Tables. Principles And Construction Of Image Intensifiers, Television Camera Tubes And Cathode Ray Tubes. Recording The Intensified Image, Methods Of Viewing The Intensified Image, Equipment For Fluorography And Cine-Fluorography. Radiographic and Fluoroscopic Tables, Telecommand Tables.

Ii Equipment for Special Procedures: Special Trolleys And Chairs, Portable And Mobile X-Ray Units, Cordless Mobile X-Ray Equipment, Capacitor Discharge Mobile Equipment, Equipments For O.T. Bi-Plane Radiography, Cranial And Dental Equipment, Skull Tables, Mammography, Mass-Miniature Radiography, Tomography (Conventional X-ray Tomography is obsolete after availability of computed Tomography (CT) scan. Only historical importance), Multi Section Cassettes, Rapid Cassette Changer, Rapid Film Changer, Magnification Radiography, Subtraction Radiography.

Iii Care and Maintenance of X-Ray Equipment: General Principles Of routine care. General Care In Use And Special Care Of Mobile Equipments. Simple Test. Uses Of Spinning Top And Step Wedge, Checks On Generator Output; Check For Integrity Of Tomographic Equipment; Procedure For Obtaining Radiograph Of The small area of body. Use Of Ma (milli Ampre) And Timer Wisconsin Test Tool, Test Of Kilo Voltage, Wisconsin Test Cassette, Use Of Focal Spot Test Tool, Testing Light Beam Diaphragm, Failures Of X-Ray Tubes And Ht Cables.

Radiography Techniques -I

- Responsibility Of Radiographer During Radiological Procedures.
- Preparation Of Patient For Different Procedures.
- Contrast Media - Positive And Negative, Ionic & Non - Ionic
- Adverse Reactions To Contrast Media And Patient Management
- Emergency Drugs In The Radiology Department
- Emergency Equipments In The Radiology Department
- Asepsis during Procedure
- Radiation Protection Rules- ALARA, Ten Day Rule.
- The Following Should Be Dealt With Indication, Contraindications, Patient Preparation, Contrast Media Used, Method Of Administration Of Contrast Media, Accessories Required, Technique To Be Adopted, Variation In Normal Technique In Specific Circumstances, Films Taken, Complications, Precautions And After-Care Of The Patient.

Preparation Of The Room, Apparatus And Instruments Positions Of The Patient: Erect, Sitting, Supine, Prone, Lateral, Oblique, Decubitus Etc., Relative Position Of X-Ray Tube And Patient, Relevant Exposure Factors. Use Of Accessories Such As Radiographic Cones, Grid And

Positioning Aids. Anatomic And Physiological Basis Of The Procedure, Association of Theory With Practical Work. Radiographic Appearances, Both Normal And Common Abnormal Conditions Where Elementary Knowledge Of The Pathology Involved Will Ensure The Application Of The Appropriate Radiographic Technique. Modifications In Technique For Various Disabilities And Types Of Subject. Radiation Protection, Use Of Gonad & Thyroid Shield, Practical Methods Reducing Radiation Dose To The Patient.

Upper limb: Routine Projections For The Whole Hand, Fingers, Wrist Joint, Forearm, Elbow Joint And Humerus. Supplementary Projections For Scaphoid, Carpal Tunnel Ball Catchers Projections, Head Of The Radius, Supracondylar Fracture And Olecranon Process.

Lower limb: Routine Projections For The Whole Foot, Toes, Calcaneum, Ankle Joint, Leg, Knee-Joint, Patella And Femurs. Supplementary Projections For Talo-Calcaneal Joint, Forced Projections For Torn Ligaments, Flat Feet, Club Feet, Intercondylar Projections For Loose Bodies In The Knee, Axial Projection For Patella.

Shoulder Girdle And Thorax: Routine Projections For The Shoulder Joint, Scapula, Acromio-Clavicular Joint, Clavicle, Sternoclavicular Joint, Sternum And Ribs.

Supplementary Projections For The Axial Projection Of Clavicle, Bicipital Groove Carotid Process, Classification Of Tendons, Subluxation, Upper Ribs, Lower Ribs And Axillary Ribs.

Pelvic Girdle And Hip Region : Routine Projections For The Whole Pelvis, Sacro-Iliac Joints, Hip Joint And Neck Of Femur.

Supplementary Projections For The Greater And Lesser Trochanters Of Femur. Frog Leg Projection, Ischeum Symphysis Pubis, Ileum, Acetabulum And Congenital Dislocation Of Hip Arthrodesis.

Vertebral Column: Routine Projections For Atlanto-Occipital Joint, Cervical Spine, Cervico Thoracic Junction, Thoracic Spine, Lumbar Spine, Lumbo-Sacral Region, Sacrum And Coccyx.

Supplementary Projections For The Intervertebral Foramina, Posterior Arch Of Atlas, Flexion And Extension Of Cervical Spine, Scoleosis And Kyphosis, Sacro Iliac Joint.

Skeletal Survey: Skeletal Survey For Metabolic Bone Diseases, Metastases, Hormonal Disorders, Renal Disorders.

Skull: Routine Projections For Cranium And Facial Bones. Supplementary Projections For Trauma, Towne's & Method, Sella, Turcica, Optic Foramina, Jugular Foramina, Temporal Bones, Mastoids Petrous Bone, Zygomatic Arches, Orbits, Maxillae, Nasal Bones, Mandible, Temporomandibular Joints.

Nasal Sinuses: Techniques For Frontal, Maxillary, Ethmoidal And Sphenoid Sinuses, Erect And Horizontal Projections For Fluid Levels.

Teeth: Routine Projections Of All Teeth –: Intra-Oral And Extra-Oral Projections. Supplementary Projections For Localisation Of Roots, Children, Edentulous Subjects And Use Of Occlusals And Bitewings, Orthopantomography.

Chest: Routine Projections For Lungs, Cardia And Diaphragm.

Supplementary Projections For Opaque Swallow, Thoracic Inlet, Soft Tissue Neck, Decubitus, 'Apicugrams, Paediatric Cases.

Abdomen: Kub, Erect Abdomen And Decubitus Projection, Supplementary Projeaions For Acute Abdomen.

Radiographic Photography And Image Processing

Dark Room Planning: For A Small Hospital, For A Large Hospital, Location Of Dark Room Construction Of Dark Room, Ventilation, Wall Protection, Entrance To Dark Room - Single Door, Double Door, Labyrinth

Dark Room: Instruction To Staff, Dry Bench, Hopper, Drawer, Cupboard, Loading And Unloading Cassettes Hangers, Types Of Hangers And Storage Of Hangers, Printing, Wet Bench, Cleanliness, Control Of Dust, Dark Room Sink, Hatches, Drier, Safe Lights, Direct And Indirect, Uses, Factors Affecting Safelight Performance, Safelight Tests, Viewing Room, Film Dispensing

X-Ray Films: Glass, Cellulose And Ployester Bases Structure Of X-Ray Films - Emulsion, Gelatin, Base And Supercoating Types Of X-Ray Films, Single Coated, Duplitised, Spectral Sensitivity, Colour Sensitivity Grainness Of Films, Speed Of Films, Screen & Non-Screen Films, Various Formats Of Films

Films For Special Procedures Storage Of Film Materials And Radiographs, Record Of Film Stock And Radiographs Deterioration Of Films On Storage, Characteristic Curves - Uses Of Step Wedge Information On Basic Fog, Film Gamma, Contrast, Speed, Film Latitude, Effects On Development

Intensifying Screens: Fluorescence - Phosphors Phosphors Employed :- Calcium Tungstate, Barium Fluochloride etc. Rare Earths Construction Of Intensifying Screens The Influence Of Kilovolatage In Different Phosphors Intensification Factor Resolving Power Of Intensifying Screens Speed Of Screens Screen Film Contact Tests Types Of Intensifying Screens Advantages And Limitations Of Intensifying Screens.

X-Ray Cassette: Construction Of X-Ray Cassettes, Types Of Cassettes, Mounting Intensifying Screens On Cassettes, Identification Of Cassettes, Care Of Cassettes

Photochemistry: Chemistry Of Image Formation, Formation Of Latent Image,Conversion Of Latent Image To Visible Image, Meaning Of Ph, Importance Of Ph In Processing Films

Processing Methods: Preparation Of Solution , Manual Processing Apparatus, Control Of Temperature, Replenishment, Rapid Processing Automatic Processor - Principle And Features, Water Supply, Use Of Thermostat, Regeneration Of Solutions, Maintenance, Advantage And Limitations. Processing Of Cut Films And Roll Films.

Computer Radiography and Direct Digital Radiography

Digital Radiography - Principles, Processing, Equipments, Advantages. Radiological Information Systems.

The Radiographic Image: The Emergent Beam Related To Densities On Film Contrast - Objective And Subjective, Long Scale And Short Scale, Radiation Contrast, Film Contrast And Radiographic Contrast, Density Sharpness, Sources Of Unsharpness, Avoiding Different Unsharpness Resolution Factors Affecting Resolution Choice Of Kilovoltage And Milliamperage Choice Of Short Focus And Broad Focus Selection Of Focus To Film Distance And Object To Film Distance Selection Of Cassettes Avoiding Scatter Radiation, Magnification, Distortion, Penumbra Presentation of a Radiograph - Identification Markers - Name Printer Viewing Equipment Magnifiers for Cut Films and Roll Films

Developer: Constituents, Characteristic, Manual and Automatic Processors, Effects on Developing Time, Temperature, Agitation, Replenisher, Exhaustion

Rinsing: Acid Stop-Bath, Methods, Objects

Fixer: Constituents, Characteristics, Manual and Automatic Processors, Fixing Time and Clearing Time Factors Affecting Fixing Time, Replenisher, Exhaustion

Washing and Drying: Objects, Methods, Factors Affecting Washing and Drying, Wetting Agents, Comparison of Different Methods

Day Light Film Handling: Day Light System Using Cassettes Day Light System without Cassettes

Film Faults: Fog - Various Fogging In Films, Causes And Prevention. Stains - Types, Causes And Prevention Spots And Splashes - Types, Causes And Prevention Marks And Prints - Types, Causes And Prevention Drying Marks - Types, Causes And Prevention Faults In Automatic Processor - Types, Causes.

Reproduction Of Radiographs: Copying Radiographs Magnification and Minfication. Contact Prints Types Of Paper Equipment

Practicals

A). Cassette And Intensifying Screens B). Chemical Used In Film Processing C). Films Used In Photography And Printers D). Diagnostic Image Processing

Imaging Technology: Practical Course:

Radiographic Technique I

Radiography - Plain Views of Upper Limb: Hands Fingers ,Thumb, Wrists, Forearm, Elbow, Humerus

Radiography - Plain Views of Shoulder: Shoulder Joint, Acromio - Clavicular Joint, Scapula Various Views And Projections, Clavicle, Sterno - Clavicular Joint

Radiography - Plain Views of Lower.Limb: Foot, Toes,Tarsus & Oscalcis, Ankle, Tibia, Fibula & Patella, Knee Joint, Femur, Hip Joint Pelvis & Sacro-Ilic Joint

Radiography Of Vertebrae: Cervical Spine Upper, Cervical Spine Lower, Cervico-Thoracic, Cervico-Middle, ThoracoLumbar, Lumbo-Sacral, Sacrum & Coccyx, Ribs-Upper & Lower, Sternum

Radiography of Skull Plain Views: Ap, Lateral & Towns, Sinuses, Mandible, Equipment,Teeth Mastoids

Radiography Of Chest: Lungs & Trachea; Heart-Diaphragm Radiography of G.I. Tract Plain X-Rays Abdomen-Erect; Liver, Spleen.

- Barium Swallow ,Barium Meal - Single Contrast And Double Contrast Barium Meal Follow Through,Small Bowel Enema,Barium Enema
- Intravenous urography
- Micturating Cysto Urethrography
- Ascending Urethrography
- Additional Investigation : Ultrasound Scanning

Reference Book: 1. Philip W. Ballinger: Merrill's Atlas Of Radiographic Positioning And Radiological Procedures (Mosby) 2. Ra Swallow, E Naylor: Clarks Positioning In Radiography E J Roebuck, A S Whitley 3. Sante Lr: Roentgenologic Technique (Edwards Inc) 4. Goldman: A Radiographic Index 5. Ross And Gailway: A Handbook Of Radiography (Lewis) 6. Glenda J.Bryan: Diagnostic Radiography (Mosby) 7. Piles: Medical Radiographic Technique (Thoms). 8. L.C.Gupta & U.C.Sahn : Radiography for Technicians (Jayee Brothers)

Radio-Imaging Technician

Curriculum Second Year-

Theory-

Physics-

C.T.Scan Physics

M.R.I.-Physics

DSA& interventional radiology -Physics

Introduction :

- Computed Tomography
- M.R.I.

- Angiography:
- Percutaneous Catheterization
- Catheterization Sites, Asepsis
- Guide Wire, Catheter, Pressure Injector And Accessories
- Use Of Digital Subtraction, Single Plane And Biplane
- Head And Neck Arteriography
- Pulmonary Arteriography
- Coronary Arteriography
- Ascending Aortography
- Trans Lumbar Aortography
- Codiac Axis, Superior Mesenteric And Inferior Mesenteric Arteriography
- Renal Arteriography
- Trans Femoral Arteriography
- Interventional Vascular Radiography

- Peripheral Venography - Lower Limb, Upper Limb
- Central Venography, Superior Venacavography, Inferior Venacavography, Pelvic Venography
- Ascending Lumbar Venography, Intra Osseous Venography, Percutaneous, plenoportography
- Transhepatic Portography, Selective Retrograde Venography - Renal Venography
- Interventional Vascular Radiography

Miscellaneous:

- Arthrography
- Sialography
- Lymphography
- Sinography

- Fistulography
- Dach reocystography

Computed Tomography:

- History
- Principles Of Computed Tomography
- Generations - Spiral C.T.
- Instrumentation.
- Data Acquisition
- Data Presentation
- Image Reconstruction
- 2 D And 3 D Images
- Image Display
- Pixel And Voxel
- C.T. Number
- Window Level And Window Width
- Scan Artefacts
- Patient Positioning In Computed Tomography
- Contrast Materials And Administration.
- Basic Diagnostic Aspects
- Interventional C.T. Guided Procedures
- Documentation.
- Safety Consideration - Radiation Dose
- Quality Assurance.

Magnetic Resonance And Imaging:

- History
- The Spinning Proton - Magnetisation, Precession, Larmor Frequency
- Radio Frequency Pulse And Proton - Resonance, Free Induction Decay, Relaxation, T-L & T-2
- Instrumentation - Magnet, Shim Coils, Gradient Coils, Radio Frequency Transmitter And Receiver Coils, Computer.
- Pulse Sequences - Saturation Recovery, Spin Echo, Inversion Recovery.
- Image Production - 2d And 3d Pictures.
- Image Quality - Signal To Noise Ratio, Contrast To Noise Ratio.
- Image Artefacts.
- Flow Techniques - Magnetic Resonance Angiography Spectroscopy. Mr Contrast Agents - Paramagnetic And Ferromagnetic Documentation. Safety Consideration Quality Assurance.

Ultrasound Imaging:

- History
- Ultrasound Characteristics - Nature, Propagation, Frequency, Wavelength, Velocity, Amplitude, Intensity, Acoustic Impendance, Reflection, Refraction Etc. Interference With Media, Interface, Attenuation.
- Transducer - Piezoelectric Effect, Construction, Types Of Arrays - Mechanical & Electronic .
- Acoustic Coupling Media.
- Ultrasound Instrumentation.
- Display Modes - A Mode, B Mode, M Mode, Real Time.
- Grey Scale Imaging
- Doppler Methods - Continuous Wave Doppler, Pulsed Doppler, Duplex, Real Time Colour Flow Imaging.
- Ultrasound Artefacts.

- Patient Preparation And Handling
- Basic Diagnostic Aspects
- Interventional Techniques - Transducer Sterilisation, Needles, Diagnostic Procedures, Therapeutic Procedures.
- Documentation
- Safety Consideration - Effects Of Healing, Cavitation.
- Quality Assurance - Phantoms, Performance, Accuracy, Sensitivity, Spatial Resolution Tests.

Digital Substraction Angiography and Interventional Radiology-

- Angiography:
- Percutaneous Catheterization
- Catheterization Sites, Asepsis
- Guide Wire, Catheter, Pressure Injector And Accessories
- Use Of Digital Subtraction, Single Plane And Biplane
- Head And Neck Arteriography
- Pulmonary Arteriography
- Coronary Arteriography
- Ascending Aortography
- Trans Lumbar Aortography
- coeliac Axis, Superior Mesenteric And Inferior Mesenteric Arteriography
- Renal Arteriography
- Trans Femoral Arteriography
    - Peripheral Venography - Lower Limb, Upper Limb
    - Central Venography, Superior Venacavography, Inferior Venacavography, Pelvic Venography
    - Ascending Lumbar Venography, Intra Osseous Venography, Percutaneous, plenoportography
    - Transhepatic Portography, Selective Retrograde Venography - Renal Venography

- Adrenal Venography, Hepatic Venography, Internal Jugular Venography, Orbital Venography
- Radiation safety for patient and technician in Interventional Vascular Radiography

· Quality Assurance - Phantoms, Performance, Accuracy, Sensitivity, Spatial Resolution Tests.

Mammography :

Basic principles of Mammography.

Equipment description.

Imaging technology.

Uses and advantages.

Interventional Radiology:

Basic principles of Interventional radiology.

Interventional Procedures.

Imaging materials, imaging technology.

Uses and advantages.

LIST OF PRACTICALS:

Skull radiography.

1. Facial bones radiography.
2. OPG and Dental radiography.
3. Portable radiography.
4. Radiography in ICU.
5. Radiography in Casualty / Trauma center.

6. Radiography in operation theatre.

LIST OF PRACTICALS:

Hands on training of Imaging of the following under supervision:

1. Imaging techniques of CT scan.
2. Imaging techniques of MRI
3. Imaging techniques in Interventional radiology.
4. Imaging techniques in Mammography.
5. Imaging techniques in CR.
6. Imaging techniques in DR.

Assessments of Knowledge of following Protocols:

1. Protocols for CT scan of Brain.
2. Protocols for CT scan of PNS, Neck & larynx.
3. Protocols for CT scan of Thorax, Abdomen and Pelvis.
4. Protocols for CT Angiography.
5. Protocols for multiphase contrast CT Study.
6. Protocols for multiphase contrast CT Study.
7. Protocols for Dynamic CT Study.
8. Protocols for MRI of Brain.
9. Protocols for MRI of PNS, Neck & larynx.
10. Protocols for MRI of Abdomen and Pelvis.
11. Protocols for MRI of Extremities.
12. Protocols for MR Angiography.
13. Protocols for MRCP.
14. Protocols for Dynamic MRI Study

Hands on training of Quality Assurance under supervision:

1. Tests to check light leakage in the cassette.
2. White light leakage test.
3. Safelight efficiency test.
4. Film/screen contact test.
5. Sensitometry test using an aluminium step wedge.
6. Collimator accuracy of scale test.
7. Light beam/x-ray beam alignment test.
8. Film/screen compatibility – colour of light emission test.
9. Grid line damage and grid movement test.
10. Test to detect cracking of lead aprons and gloves.
11. Accuracy of timer and kVp test.
12. Test alignment of x-ray beam to upright bucky.
13. Cassette centered to the middle of the bucky test.
14. Central ray centered to the middle of the bucky test

BOOKS-

Reference Books:

1	Piles	:	Medical Radiographic Technique (Thomas)
2	Santel.R.	:	Roentgenologic Technique (Edwards Inc)
3	Philip Wballiger	:	Merils Atlas Of Radiographic Positions And Radiological Procedures (Mosby)
4	Goldman	:	A Radiographic Index
5	Patesson	:	Printed Notes For Radiographers In India (Cmai)
6	Achwaz	:	Unit Step Radiography (Thomas)
7	Ross & Galloway	:	A Hand Book Of Radiography (Lewis)
8	Glenda J. Bryan	:	Diagnostic Radiography (Churchill Livingstone)
9	Jacobi & Paris	:	Textbook Of Radiological Technology (Mosby)
10	Scarrow	:	Contrast Radiography (Schering Chemicals)
11	Vanderplasts	:	Medical X-Ray Technique (Mac Millan)
12	Stephen Chapman& Richare Nakielny	:	A Guide To Radiological Procedures (Jaypee Brothers)
13	R.F. Fatr & P.J. Ahisy :	:	Physics For Medical Imaging (Saunders)
14	D.N. Chesney & M.O. Chesney :	:	X-Ray Equipment For Student Radiographers (Cbs)
15	Christensen, Curry & Dowdey	:	An Introduction Of Physics To Diagnostic Radiography (Lea & Febiger)
16	Cullinan	:	Illustrated Guide Techniques (Blackwell)

17	Jamdrell, Thompson & Ashworth :	:	X-Ray Physics And Equipment (Blackwell)
18	Adrian K.Dixon :	:	Body C.T. - A Handbook (Churchill Livingstone)
19	John M. Stevens, Alan R. Valentine & Brian E. Kendall	:	Computed Cranial & Spinal Imaging (Williams & Wilkins)
20	John R. Haaga, Charles F. Lanzion, David J. Sartoris & Elias A.Aerhouni	:	Computerised Tomography And Magnetic Resonance Imaging Of The Whole Body (Vol.1 & Ii) (Saunders).
21	Philip T. English & Christine Moore	:	Mri For Radiographers (Springer)
22	Rehani:	:	Diagnostic Imaging - Quality Assurance.
23	Pablo R.Ros & W. Dean Bidgood :	:	Abdominal Magnetic Resonance Imaging (Mosby)
24	Roger C. Sounders :	:	Clinical Sonography : A Practical Guide (Little Brown & Company)
25	Pes Palmer :	:	Manual Of Diagnostic Ultrasound (Who)
26	Sandra L Hagen Ansert:	:	Text Book Of Diagnostic Ultrasonography (Bi Publications).

27 Meril's Atlas of Radiographic Positioning

Name of Course- Radio imaging Technician

Eligibility- B. Sc Physics/chemistry/Biology/Biotechnology

Language of course-English

Total Seat-8

Duration of Course

2 Year

Selection

Merit based by V.N.S.G.U.

Documents required

1. Birth Certificate as proof of date and birth.

2. proof of Nationality and Address

3. Four passport size photographs

4. Copy of Mark sheets and Degree Certificate

5. 10th and 12 th Marksheet/certificate

6. Computer training certificate

EXAM- At the end of second year

Theory -100

Practical-100

Examiner- Two Internal Examiner from SMIMER

Exam Pattern-

Theory – MCQ-25 Marks, 5 Shortnotes- 25 marks, L.A.Q- 5X10 = 50 Marks

Practical- (1- X-ray Taking – 2 different regions of the body as asked by examiners -40 marks

(2 Viva Table-1- X-RAY Physics ,CR DR ,Procedure and Radiation Safety- 30 marks

(3 Viva Table-2 C.T., M.R.I., Angiography , Contrast- 30 Marks

- Correctly Identify the Anatomy to Imaged.
- To properly position the patient for Imaging
- Correctly select appropriate projection/projections to demonstrate the area of interest.
- Use appropriate radiographic parameters to produce a radiograph with satisfactory results.
- Differentiate a properly positioned and exposed radiograph from a wrongly positioned and over or underexposed radiograph.

- Correctly identify anatomical features displayed in radiograph obtained.
- Use Special techniques in Wards, ICU, and Operation Theatres.

Students will identify and observe the objects and draw the following diagrams:

1. Cross sectional diagram of X-ray Film.
2. Cross sectional diagram of Intensifying Screen.
3. Characteristic Curve.
4. X-ray Tube.
5. CT scan Tube.