Regulations, Curriculum, Syllabus (2018-2019)

Diploma in Radiography & Imaging Technology

Course Guidelines & Framework

Eligibility	12th Std School Passed and 17years of age.
Duration	2 Years study + 6 months internship
Number of Beds	50 Beds
X-Ray	300 MA X-Ray Machine –1 C-Arm X-Ray -1
CT Scan	1
Tie Up	MRI, Cath. Lab - Optional
Maximum Student Intake	10
Medical College	Medical Colleges affiliated to Tamil Nadu Dr.MGR Medical University can start this course with maximum student intake of 20.
Common Room	1
Class Rooms (25x10sq ft)	2
Multimedia	LCD projector.
Library	Minimum 100sq ft With Computers & Internet facility Minimum of 100books
Teaching Responsibility	Designated Course Director should be a Radiologist -1
Faculty	Part time Lecturers to be named- Radiologists, Neurologist, Nephrologist Ortho specialist, ENT specialist Gastroenterologist, OB&G and other specialities.
Training Modality	
1st Year	Theory on 1st year subjects.
2nd Year	Theory on 2nd year subjects + Practicals and Log Book.
Examinations	
1st Year	Theory Examination + Practical
2nd Year	Theory Examination + Practical +Viva
Fee	
University Affiliation Fee	Rs.1lakh - one time fee.
Security Deposit	Rs.1lakh - refund as per university norms
Inspection Fee	Rs.15000
Inspection Duration	Yearly for first two consecutive year. Thereafter once in three years.
Student Registration - University Fee	Rs.500 per student.

BRIEF SUBJECT TITLE TO BE COVERED

Main Subjects		Supportive Subjects
Ist Year		
1	Human Anatomy & Physiology , Radiology Physics.	English
2	General Physics, Radiation Physics & Physics of Diagnostic Radiology	Basics of Computer
3	X-Ray Machines & Accessories, Maintenance.	Medical Ethics and patient care
4	X-ray Film / Image processing Techniques (Dark Room Techniques)	
IInd Year		
5	Clinical Radiography-Positioning	Principles of Medical Emergencies
6	Equipments, Techniques of modern Imaging Modalities	
7	Contrast & Special Radiography procedures.	
8	Quality Control at Radiology & Radiation Safety	

NOTE: For the supportive subjects Internal Examination to be conducted by the institute conducting the course and marks should be submitted to the University.

Syllabus for Diploma in Radiography Imaging Techniques

Ist Year

Theory

(1) English - Communication skills - (50hrs)

(2) Basics of Computer (Computer Applications related to Radiography) - **(50hrs)**

(3) Medical Ethics and patient care - (50hrs)

(4) Human Anatomy - & Physiology - (100hrs)

Scope of Anatomy and Physiology - Definitions and Terms in Anatomy and Physiology- Structure and function of human cell - Elementary tissues of human body- Brief account on Composition of Blood - functions of blood elements - Blood Group and coagulation of blood.

Cardio Vascular System

(Structure and functions of various parts of the heart, arterial and venous system, brief account on common cardiovascular disorders).

Respiratory System

(various parts of respiratory system and their functions, Physiology of Respiration).

Digestive System (names and various parts of digestive system-Liver, Spleen, Gall Bladder, Pancreas, Buccal Cavity, Pharynx, Oesophagus, Stomach, intestine etc.-physiology of digestion and absorption)

Urinary System (various parts of urinary system and its function-structure and function of kidneys-physiology of urine formation - pathophysiology of renal disease and edema.)

Reproductive System (physiology and anatomy of Male & Female reproductive system-Prostate & Uterus & Ovaries etc.)

Musculoskeletal System (Classification of bones & joints, structure of skeleton –structure of skeletal muscle – physiology of muscle contraction)

Nervous System (various parts of nervous system- Brain and its parts –functions of nervous system - Spinal Cord & Nerves).

Ear, Nose, Throat and Eye (Elementary knowledge of structure and functions of organs of taste, smell, hearing, vision.)

Endocrine System (Endocrine glands ,their hormones and functions-Thyroid, Parathyroid, Suprarenal, Pituitary, pituitary and Thymus)

Haemopoietic and Lymphatic System (Name of the blood vessels & lymph gland locations).

Surface Anatomy & Surface Markings of Human Body.

Practicals (75 hours)

Study of Human Skeleton parts with skeletal models..

Study with charts and models of all organ systems mentioned above.

Microscopic slides examination of elementary human tissues, cells.

(5) Radiology Physics, Radiation Physics & Physics of Diagnostic Radiology - (100hrs)

Basic concepts of power, work, force, energy, electricity, magnetism and their units and measurements- einstein's formula – electromagnetic induction – Atomic structure – radioactivity- ionization and excitation - electromagnetic waves – X-rays production and properties – X-ray tube - quality of x-rays – factors affecting quality and intensity of x-rays. X-ray circuits - interaction of X and gamma rays - X-radiation measurements etc. Principles of Radiation detection and measurements – TLD, Pocket Dosimeter, Radiation Survey meter and radiation zone monitor.

Practicals - (50hrs)

Study with charts, models & power point presentations Atomic structure, X-ray tubes, X-ray circuits involving students to present and discuss.

(6) <u>X-Ray Machines & Accessories and their Maintenance</u> - (100 hrs)

X-ray machines – Anode & Cathode - Thermionic diode – X-ray valves and tubes – principle and practical aspects – semiconductors – triode valves – cathode ray oscilloscopes – X-ray circuits – self rectifying circuits – half wave pulsating voltage circuits – full valve pulsating voltage circuits - measurement of high voltage – control of KV circuit – mA circuit. X-ray beam quality

(7) <u>X-ray Film / Image processing Techniques</u> - (50hrs)

X-ray Films- X-ray cassettes - Intensifying screens X-ray films types – basic film structure & quality – choosing films for different studies - basics on hard copies of radiographic images – dry & wet processing – Fixer –Developer –film processing methods - manual and automatic processing – conventional & modern image processing rooms – image processing equipments – types & maintenance – day light systems advantages & disadvantages – processing faults –- glossy prints, paper prints etc – production of best quality images. Intensifying screen- Fluorescence - structure of Intensifying screens – Casette types – screen un-sharpness etc.

Practicals (50hrs)

X-ray Films- X-ray cassettes - Intensifying screens, other imaging hard copies, image processing equipments with demonstration.

EXAMINATION SCHEDULES

1ST YEAR

	THEORY
PAPER-I	Human Anatomy & Physiology relevant to Radiology.
PAPER-II	General Physics, Radiation Physics & Physics of Diagnostic Radiology.
PAPER-III	X-Ray Machines, Accessories & Maintenance.
PAPER-IV	X-ray Film / Image processing Techniques.

PRACTICALS & VIVA
Identification of Bones
Identification of X-Ray equipments/ parts.
Dark room Techniques
Models, Charts etc.,

Note**:** For the supportive subjects English, Basics of Computer and Patient Care, internal tests to be conducted by the institute conducting the course during Ist year of the course and marks should be submitted to the University.

MARK SHEDULE

SCHEME OF EXAMINATION

FIRST YEAR

(270 WORKING DAYS)

Theory Subject Title	University Theory Exam		Practical Subject Title	Practical Marks		VIVA		IA	
	Max	Min		Max	Min	Max	Min	Max	Min
Human Anatomy & Physiology relevant to Radiology.	100	50	Identification of Bones, Joints & Organs	100	50	50	25	50	25
General Physics, Radiation Physics & Physics of Diagnostic Radiology.	100	50	Identification of parts of equipments.	100	50	50	25	50	25
X- ray Machines Accessories	100	50		100	50	50	25	50	25
X-ray Film / Image processing Techniques.	100	50	Cassette screen, Film Sizes, Development .	100	50	50	25	50	25

Theory 100 Marks
Practical 100 Marks
Viva 50 Marks
IA 50 Marks

Internal Assessment	**Marks**
Theory	20
Practical	20
Log/Record work	10
Total	**50**

Text Books to be Read

1. Anatomy and Physiology for Nurses – Evelyn. C. pearce
2. Anatomy and physiology for students - Senthil kumar
3. Physics for Radiography - Hay and Hughs
4. Radiographic latent image processing – W. E. J Mckinney

Reference Books

1. Anatomy and Physiology for students –Senthil kumar
2. Surface and Radiological Anatomy – Hamilton et al (Heffer)
3. Anatomy and Physiology for Radiographers- C.A. Werrick
4. Basic Radiological Physics – Thayalan
5. Care of patient in diagnostic Radiography – Chesney & Chesney.
6. Practical Nursing and First Aid – Ross and Wilson.

Syllabus for Diploma in Radiology Imaging Techniques

IInd Year

(7) Clinical Radiography-Positioning - (200hrs)

Radiological Equipments – X-ray machine - transformers, x-ray units, fluoroscopy, grids and filters - Positional Radiography - Radiographic views of different parts of the body – Chest, Abdomen, Upper Limb, Cervical & Thoracic Spine, Lumbar Spine, Sacrum & Coccyx, Bony thorax - Sternum & Ribs, Skull and cranial bones, facial bones, paranasal sinuses, Mastoids & Temporal bones etc. Upper & Lower GIT, Gall Bladder & Biliary duct, GUT etc.

Practicals - (200hrs)

Radiographic positioning of all parts of the body.

(9) Equipments, basic Techniques of modern Imaging Modalities - (50 hrs)

C.R (principle, equipment & imaging)
Digital Radiography (principle, equipment & imaging)
Mammography (basic principle, equipment & image acquisition)
CT (Basic physics – Tomography principle - basics of plain studies, contrast studies, special procedures)
MRI (basic principle – imaging methods - slice section- plain & contrast studies – image contrast – factors affecting image quality)
USG (Basic acoustics - ultrasound terminologies – Interaction of US with matter – Ultrasound display modes etc)

Practicals - (50hrs)

Demonstration of basic procedures in all modern modalities.

(8) <u>Contrast & Special Radiography procedures</u>. - (100hrs)

Barium swallow - barium meal - barium enema (single and double contrast), Enteroclysis PTBD, Sinograms, Fistulograms, IVU, AUG, MCU, HSG, Sialogram, T-tube Cholangiogra –Fluroscopy, Image intensifiers - Tomography basics, etc

<u>Practicals</u> - (150hrs)

Positioning and imaging of all kinds of contrast & special radiographic procedures

(9) <u>Quality Control in Radiology & Radiation Safety</u> - (50hrs)

Quality control procedure in Radiology as per NABH.

Biological effects of Radiation – Radiation dose –Effects of time, distance and shielding – personnel and area monitoring – Planning of X-ray rooms, dark rooms – Evaluation of workload versus radiation factors – Radiation safety instruments - ICRP / AERB recommendations.

<u>Practicals</u> - (50hrs)

Radiation protection survey in diagnostic X-ray installations.

EXAMINATION SCHEDULES

IInd Year

	THEORY
PAPER-I	Clinical Radiography - Positioning
PAPER-II	Equipments, basic Techniques of modern Imaging Modalities
PAPER-III	Contrast & Special Radiography procedures.
PAPER-IV	Quality control in Radiology and Radiation Safety

PRACTICALS & VIVA
Long Case -Demonstration of Positioning.
Short Case -2 a. Contrast Procedure b. Developing and Dark Room Techniques. Log Books Test Marks

Note**:** For the supportive subject ‘Principles of Medical Emergencies’ internal test in the subject to be conducted by the centre conducting the course, during IInd year of the course and marks should be sent to University.

MARK SCHEDULE

SCHEME OF EXAMINATION
SECOND YEAR
(270 WORKING DAYS)

Theory Subject Title	University Theory Exam		Practical Subject Title	Practical Marks		VIVA		IA	
	Max	Min		Max	Min	Max	Min	Max	Min
Clinical Radiography-Positioning	100	50	Long case-1 Demonstration of positioning.	-	-	-	-	50	25
Equipments, Basic techniques of modern Imaging Modalities	100	50	Identification of equipments & parts.	100	50	50	25	50	25
Contrast & Special Radiography procedures.	100	50	Short Case -2 a. Contrast Procedure b. Developing and Dark Room Techniques. LOG BOOK TEST MARKS	100	50	50	25	50	25
Quality Control in Radiology and Radiation Safety	100	50	Radiology safety equipments-demo	-	-	-	-	50	25

Theory	100 Marks
Practical	100 Marks
Viva	50 Marks
IA	50 Marks

Internal Assessment	**Marks**
Theory	20
Practical	20
Log/Record work	10
Total	**50**

Question Paper Pattern

	No. of questions	Marks per question	Total Marks
Essays	3	10	30
Short Notes	10	5	50
Short Answers	10	2	20
	Total		**100**

Postings during 6 months Internship

Area	**Time**
Radiography, Plain and Contrast studies, DSA, Special Radiographic Procedures, Mammography and Dental Radiography	4 months
Higher Modalities, CT, MRI, DSA, Nuclear Medicine (2 weeks)	2 months

Text Books to be Read

1. Radiographic Imaging - Derrick
2. Physics and photography principles of Medical Radiography – Seeman and Herman.
3. First Aid – Haugher and Gardner