Diploma in Medical Radiography Technology

Year I

Objectives of the Course
Medical radiology is a way of providing good diagnosis to patients. This course aims to provide a holistic understanding of radio diagnosis and medical imaging technology as well as techniques. The students will develop an understanding of handling of various related equipment and appropriate posturing of the patient in order to get the best of the image. Above all the student will get an overall development of personality that is enriched with knowledge, covered by training and applied with good professional skill.

Paper I : Anatomy

Sr. No.	Topics	Hrs.
1.	Introduction to Anatomy – Terminology, allied branches, importance	05
2.	Human cells and tissues – Muscle, blood, gland, bone, nerve, reproductive cells and tissues – organization	15
3.	Directional references of human body, position and planes	05
4.	Body cavities – Dorsal and ventral	02
5.	Skeletal System – Terminology, position, basic details. Joints – Terminology, types, structure	15
6.	Integumentary System and Muscles – Terminology, basics	10
7.	Blood – Terminology, composition, lymphatic details and clotting system.	10
8.	Respiratory System – Terminology, position, structure, parts.	10
9.	Gastrointestinal System – Terminology, position, structure, parts.	10
10.	Urinary System – Terminology, position, structure, parts.	10

11.	Male Reproductive System – Terminology, position, structure, parts	05
12.	Female Reproductive System – Terminology, position, structure, parts.	05
13.	Endocrine System – Terminology, position, structure	10
14.	Brain and Spinal Cord – Terminology, structure,	10
15.	Sensory organs (eyes, ears, nose and tongue) – Terminology, functions.	10
16.	Cardiovascular System – Terminology, structure. Vessels entering and leaving the heart. Arterial and venous tree.	10
17.	Lymphatic System – Terminology, WBCs, spleen, tonsils and lymph nodes	05

Reference Books

1.	Handbook of General Anatomy	B. D. Chaurasia	CBS Publishers
2.	Clinical Anatomy	Richard S. Snell	Wolters Kluwer | Lippincott Williams & Wilkins

Paper II : Physiology

Sr. No.	Topics	Hrs.
1.	Introduction to Physiology – Terminology, allied branches, importance	02
2.	Blood – Composition and functions, counts and functions of blood cells, coagulation steps and anticoagulants, importance of blood group, functions of lymph, blood transfusion: cross-matching, indications and complications.	10
3.	Respiratory System – Mechanism and functions of respiratory system, transport of respiratory gases, definition of respiratory rate, tidal volume, vital capacity, hypoxia and artificial respiration.	10

4.	Excretory System – Nephron (functions of glomerulus and tubules), functions of kidneys. Mechanism of urine formation, regulation of water excretion, diuresis and diuretics	10
5.	Gastrointestinal System – Composition and functions of saliva, mastication and deglutition. Functions of stomach, composition and function of gastric juice. Pancreatic juice, bile and digestion of food by different enzymes, absorption and defecation.	10
6.	Cardiovascular System - Cardiac cycle, heart rate regulation and factors affecting, ECG, heart block and its output on ECG, variations of arterial blood pressure.	10
7.	Endocrine System – Major endocrine glands, hormone classification, functions and mechanism of action. Disorders related to hormones.	10
8.	Reproductive System - Sex differentiation, functions of testes, pubertal changes in males, spermatogenesis, testosterone action and regulation of secretion. Functions of ovaries and uterus, pubertal changes in females, menstrual cycle, ovarian cycle, 10 uterine cycle, pregnancy and related tests, physiological changes during pregnancy, functions of placenta, physiology related to lactation.	
Lab – Anatomy & Physiology		
1.	Study of the human skeleton	
2.	Study with the help of charts and models of digestive system, respiratory system, ear, cardiovascular system, reproductive system, eye and urinary system	
3.	Microscopic examination of epithelial tissue, cardiac muscle, smooth muscle, skeletal muscle. Connective tissue and nervous tissues	
4.	Examination of blood films for TLC.DLC and malarial parasite	
5.	Determination of RBCs, clotting time of blood, erythrocyte sedimentation rate and Hemoglobin Value	
6.	Recording of body temperature, pulse, heart-rate, blood pressure and ECG	
Note – The study of physiology and anatomy should be coordinated so that the structure and functions can be explained and understood clearly.		
Reference Books		

1.	Essentials of Medical Physiology	K. Sembulingam	Juta Limited
2.	Concise Medical Physiology	Sujit K. Chaudhuri	New Central Book Agency (P) Limited

Paper III : Dark Room Techniques

Sr. No.	Topics	Hrs.
1.	Dark Room – Introduction, importance, layout, ventilation, illumination, accessories and maintenance	03
2.	Developer and Fixer – Ingredients and their corresponding action, exhaustion and methods of determination. Effect of temperature on fixing and ways to handle it.	05
3.	Developing – Process, fixing, rinsing, dry and wet bench (characteristics and features),	10
4.	X-Ray Films - Film material, construction of films, types of films, storage of films, sizes, film speed. New film types (laser films, dry and wet laser films).	10
5.	X-Ray Screens – Construction, uses and types. Care of screens, advantages of film-screen combination. Technique modification in relation to speed. Fluorescence - Principles of fluorescence and phosphorescence, rare earth screens , blue and green screens	15
6.	Film Processing – Methods (manual and automatic film processing and their corresponding advantages and disadvantages), washing, drying, hangers (clip hangers and channel hangers). Chemicals for Film Processing - Developers, fixers, rinser, replenisher solution etc.	15
7.	Film Fog – Definition, types of fog, causes of fog. Effect of temperature, sunlight in improper storage, old films, artifacts. Cassettes – Design , care, construction, types and mounting	10

Lab – Dark Room Techniques

1.	To prepare the patient for X-ray
2.	To perform all x-rays
3.	To learn techniques of protecting from radiation hazard
4.	To perform contrast x-ray
5.	To read and interpret different X rays
6.	To maintain all records

Reference Books

1.	Lecture Notes on Radiology	Pradip R. Patel	Wiley
2.	X-Rays and Their Applications	J. G. Brown	Springer

Paper IV : General Physics and Radiation Physics

Sr. No.	Topics	Hrs.
1.	Basics Of Physics – Concept of power, work, energy, magnetism, electromagnetism and electromagnetic waves, Neil Bohr's atomic models, mass number, isotopes, valency, ionization.	05
2.	Basics of Physics – Thermionic emission and rectification principles in context of x-ray technology. High voltage circuits, effect of changing tube voltage, current and filtration, HT waveform in x-ray production units. Wave Characteristics – Attenuation, absorption, scattering, pair production and annihilation process of waves.	10
3.	Introduction to X-rays – Terminology, basics, history, origin, nature, sources, X-ray tube, control panel and circuit.	10
4.	Production of X-rays – Production requirements (electron source, target and anode material), necessary conditions for production of X-rays (tube voltage, current, space charge, cathode assembly, efficiency, stationary and rotating tubes, kVp , mAs)	15
5.	Quality of X-rays – Efficiency of X-rays production, factors affecting quality and intensity of X-rays, quality and quantity of	15

	X-rays	
6.	Transmission of X-rays – Transmission of rays through body tissues, linear transfer of energy, range of secondary electrons, relative scatter from homogenous and heterogeneous beam passage through patient.	20
7.	Radiological Calculations – Exponential and trigonometric functions for radiological calculations. Units of radiation measurement. Radiation detectors and phantom materials	15
8.	X-ray Machines – Description, understanding and working.	10
9.	Detection of Radiation – Field survey instrument, POSL etc.	15
10.	Protection from Radiation – Principles of personnel exposure reduction (time, distance, shielding, protective barriers and devices. Protection of Patients (beam limitation technique selection, general shielding. Image receptors, projection etc.). exposure during pregnancy	25

Lab – General Physics and Radiation Physics

1.	Observation of X-ray tubes general features and mobile equipment.
2.	Care and maintenance of X-ray equipment and image intensifier
3.	To study effects of Kilo Voltage Peak (KVP) and Milli Ampere Second (MAS)
4.	To check the safety of dark room.
5.	To check the speed of intensifying screen.
6.	To check the developing time test and function.
7.	Silver recovery method

Reference Books

1.	The Physics of Radiology and Imaging	K Thayalan	Jaypee Brothers Medical Publishers
2.	Radiological Physics	M. E J Young	Academic Press