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Govt. of West Bengal  
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Youth Services, Govt. of West Bengal



# RADIOGRAPHY DIAGNOSTIC TECHNICIAN

Run by :



I·R·H·C  
INSTITUTE OF  
RURAL HEALTH CARE

# RADIOGRAPHY DIAGNOSTIC TECHNICIAN

## Course Syllabus

**Course Name** : Radiography Diagnostic  
**Course Duration** : 12 months

## INTRODUCTION RADIOGRAPHY DIAGNOSTIC

The Radiography Diagnostic is a comprehensive course that equips students with the skills and knowledge required to operate medical imaging equipment and perform diagnostic procedures. This program is designed for individuals who are interested in pursuing a career in radiography and wish to develop a strong foundation in this field.

Throughout the course, students will learn about the principles of radiography, radiation safety, anatomy, physiology, pathology, and patient care. They will also gain practical experience in operating X-ray machines, computed tomography (CT) scanners, magnetic resonance imaging (MRI) scanners, and other imaging equipment. In addition, students will learn how to analyze and interpret images, communicate effectively with patients and other medical professionals, and maintain accurate records.

Upon successful completion of the Diploma in Radiography Diagnostic, graduates will be able to pursue a variety of career opportunities in hospitals, clinics, and other medical facilities. These may include positions as radiologic technologists, diagnostic medical sonographers, or nuclear medicine technologists, among others.

Overall, the Diploma in Radiography Diagnostic is an excellent option for individuals who are interested in the healthcare industry and wish to play a vital role in diagnosing and treating illnesses and injuries.

## Desirable and Benefits of Radiography Diagnostic

Radiography is a diagnostic imaging technique that uses X-rays to produce images of the internal structures of the body. It is an essential tool for the diagnosis and treatment of a wide range of medical conditions. To ensure that radiography procedures are conducted safely and effectively, a desirable course of radiography diagnostic should include the following:

1. **Basic Principles of Radiography:** The course should cover the basic principles of radiography, including the physical properties of X-rays, radiation safety, and image formation. This will provide a foundation for understanding the more advanced techniques and technologies used in radiography.
2. **Anatomy and Physiology:** A thorough understanding of anatomy and physiology is essential for interpreting radiographic images. The course should cover the anatomy and physiology of the body systems commonly imaged using radiography, such as the skeletal and respiratory systems.
3. **Radiographic Procedures:** The course should cover a range of radiographic procedures, including positioning and technique for common imaging exams such as chest X-rays, abdominal X-rays, and extremity X-rays. It should also cover specialized techniques such as fluoroscopy and computed tomography (CT) scanning.
4. **Patient Care:** Radiographers must be skilled in-patient care, including communication, patient positioning, and radiation protection. The course should emphasize the importance of patient comfort and safety during radiography procedures.

5. **Image Interpretation:** The course should provide training in image interpretation, including the identification of normal and abnormal anatomy and the recognition of artifacts and technical errors that can affect image quality.
  6. **Quality Control:** The course should cover quality control measures to ensure that radiography equipment is functioning properly and producing high-quality images.
  7. **Professional and Ethical Considerations:** Radiography professionals must adhere to strict ethical and professional standards. The course should cover topics such as patient confidentiality, informed consent, and professional communication.
- Overall, a desirable course of radiography diagnostic should provide students with a comprehensive understanding of the principles, procedures, and ethics of radiography, preparing them for a rewarding and fulfilling career in this important field.

## SYLLABUS

**Total Course Duration: 360-hour**

### **Module 1: Basic Anatomy and Physiology (60 hours)**

i. Overview of human anatomy and physiology	8hrs
ii. The musculoskeletal system	8hrs
iii. The cardiovascular system	10hrs
iv. The respiratory system	8hrs
v. The nervous system	10hrs
vi. The digestive system	8hrs
vii. The Reproductive System	8hrs

### **Module 2: Radiological Physics (60hrs)**

1. Structure of atom, Atomic No., Mass No., Isotopes & Radio-isotopes, Binding energy, Quantum level, etc.	3hrs
2. Electromagnetic radiation, spectrum.	3hrs
3. Production of Cathode rays and X-rays. Types of X-rays: Soft, Hard, Characteristic, Bremsstrahlung.	3hrs
4. X-ray tube: construction. Cathode, anode & Types of X-ray tubes. Thermionic emissions, Line focus principle, Heel effect.	3hrs
5. X-ray generators: Parts. Electric supply: Single phase/three phase supply, Ac/DC current, defn. of amp. Volt, electron volt.	3hrs
6. Control panel: Parts with labeling, Switches: mechanical, electronic.	3hrs
7. Transformer assembly: Electromagnetic induction, Laws of transformers, Capacitors, and Rectifiers, solid-state rectifier, Rectification: types.	3hrs
8. HT circuit, Low voltage circuit: diagrams and description	3hrs
9. Exposure timers: Interlock and other safety devices.	3hrs
10. Portable and Mobile X-ray machines. Mammography X-ray machine.	3hrs
11. Filters and filtration.	3hrs
12. X-ray beam restrictors: diaphragms, cones, cylinders, Collimators.	3hrs
13. Interaction of X-rays with matter.	3hrs
14. Scatter radiation and Grids. Construction and types of grids. Advantages and disadvantages. Grid cut-off. Grid performance.	3hrs
15. Fluorescence, phosphorescence: Fluoroscopy and IITV (Image intensifier) along with its construction, spot film device.	3hrs
16. Digital X-ray: CR, DR, DSA, Tele-radiology, PACS.	3hrs
17. Basic idea about X-ray films and picture production, Umbra, penumbra.	3hrs

18. Basic idea about the cassette, screen, and darkroom work. 3hrs
19. Inverse square law. Measurement of radiation: radiation units. 3hrs
20. Hazards of radiation. Radiation protection, Principles, and measures. National & International recommendations, Dosimeters: TLD Badges, its construction. 3hrs

### **Module 3: Radiographic photography and Dark-room Techniques (60hrs)**

1. X-ray Film: Construction, Types of emulsion, characteristics, and control, screen & non-screen films, Film under & overexposure, Film speed, and Film contrast. 6hrs.
2. Intensifying Screen: Construction, Fluorescence. Type of intensifying screens, Rare earth screen intensification factors. Cleaning and general care of screen. 6hrs
3. X-ray cassette: Construction, testing and proving good screen contact, general care. 6hrs
4. Dark Room Processing: Defn., steps, suitable fresh water supply. 6hrs
5. X-ray film Developers: types: powder and liquid solution, how to prepare Functions and constituents of developer, medium & high contrast developers. Ultra-rapid development, Standardization by time and temperature, Exhaustion of developer, replenishers, and Farmer's reducer. 6hrs
6. X-ray Fixers and fixation: How to prepare? Constituents of fixer and fixating agents. Time of fixation, silver recovery. 5hrs
7. Processing: Steps, storage of dry chemicals, storage of solutions, Technical and processing faults, Film fog, etc. Operation theatre processing: Dish units, Refrigeration. Use of Ice. 5hrs
8. Dark Room: Construction, Storage of Films. 5hrs
9. Radiographic Image: Factors affecting image contrast, detail, sharpness, and image quality depend on exposure time, filters, distance, screen, grid, film speed, and darkroom processing. 5hrs
10. Presentation of Radiograph: Identification of film: Lead letters and lead numbers, actinio markers, aspect for direct and stereo viewing, Mounting of dental films. 5hrs
11. Presentation accessories: View boxes, spot-light, illuminators, projectors, and viewing screens for miniature and cine-radiography, magnifiers. Embossing machine, film trimmers, corner cutters, dental mounts and cutter, filling units. 5hrs

### **Module 4: Construction of X-ray Room and arrangement of different rooms in an X-ray setup (60hrs)**

1. Care and maintenance of equipment: General principles and routine use, Radiographic calibration procedure. Tube rating charts. 6hrs
2. First Aid: Shock, convulsion, asphyxia, artificial respiration, Administration of Oxygen, Burns and scalds. Electric shock and burns. Wound, haemorrhage, pressure points, Tourniquet, Injuries to Bones, Joints and muscles, Dressing of Bandages, Plaster of Paris technique, Splints, Drug reaction, Poisons, Basic Nursing. 6hrs
3. Drug in Department: Storage labeling. Checking, Regulations regarding dangerous drugs, Units of measurement. 6hrs

4. Medical Ethics: Ethical law and professional etiquette applied to members of the profession associated with medicine. 6hrs
5. Nursing and Handling of patients: Hospital and Departmental procedure, Hospital staffing, and organization. Records and departmental statistics. Medico-legal aspects. Appoints. Stock taking and stock keeping. 6hrs
6. Care of patients: Reception, Elementary hygiene. 6hrs
7. Nursing Care: Temperature, pulses, and respiration. Application of sterile dressings. 8hrs
8. Preparation of patients for General X-ray examination: Departmental instructions to out-patients or ward staff. Instructions for various special investigations. Nursing care before and after special X-ray. Drug allergy. 8hrs
9. Principles of asepsis: Methods of sterilization. Care and identification of instruments. The setting of trays and trolleys. Elementary operating theatre procedure. 8hrs

### **Module 5: Magnetic Resonance Imaging (60hrs)**

1. Magnets – types, powers, magnetism Radio Frequency (RF) pulse T1 (longitudinal relaxation time) T2 (transverse relaxation time). 12hrs
2. Basic sequences, basic parameters and basic tissue (like fat and water) Different types of coils. 12hrs
3. Contrast agents, MR angiography and dynamic MR. 12hrs
4. Spectroscopy. 12hrs
5. Hazards, safety and limitations. 12hrs

### **Module 6: Ultrasonography (60hrs)**

1. Basic Physics: Characteristic of sound; Propagation of sound; Interaction between ultrasound and matter attenuation and reflection; Transducers; Ultrasound display, A, TM, B-mode Grayscale imaging; Scanning methods; Doppler techniques; Artefacts Safety Application.

## **Job Opportunity**

Radiography diagnostic is a field of healthcare that involves using medical imaging technologies to produce high-quality images of the internal structures of the body. There are a variety of job opportunities available for individuals who have completed training in radiography diagnostic. Some common job titles include:

**Radiologic Technologist** - This is the most common job title for individuals who have completed radiography diagnostic training. Radiologic technologists are responsible for operating imaging equipment, positioning patients, and producing high-quality images.

**MRI Technologist** - MRI technologists specialize in using magnetic resonance imaging (MRI) equipment to produce detailed images of the body. They must be highly skilled in operating this complex technology and have a strong understanding of anatomy and physiology.

**CT Technologist** - CT technologists operate computed tomography (CT) scanners to produce detailed cross-sectional images of the body. They work closely with radiologists to ensure that high-quality images are produced and interpreted accurately.

**Mammography Technologist** - Mammography technologists specialize in using specialized equipment to produce images of the breast. They play a critical role in the early detection of breast cancer.

**Radiation Therapist** - Radiation therapists work with oncologists to provide radiation treatment to patients with cancer. They use highly specialized equipment to deliver targeted doses of radiation to specific areas of the body.

Overall, there are many job opportunities available for individuals who have completed training in radiography diagnostic. These positions offer competitive salaries and the chance to work in a dynamic and rewarding field of healthcare.