

Eklavya University, Damoh (MP)

X-Ray

Syllabus 2022-23

School of Nursing & Paramedical Science



EKLAUVYA
UNIVERSITY

School Of Nursing & Paramedical Science

ज्ञानं प्राप्तये लक्ष्यं संधानम्

Esttd. by Madhya Pradesh Nij. Vishwavidyalaya (Sheepna Avam) Sanchalana Adhyaksh. 2020

**Department of
Paramedical Science**

Syllabus

for

CERTIFICATE IN X-RAY TECHNICIAN



CERTIFICATE IN X-RAY TECHNICIAN

VISION STATEMENT OF EKLAVYA UNIVERSITY

Eklavya University, will transform lives and communities through learning.

MISSION STATEMENT OF EKLAVYA UNIVERSITY

- Nurture achievers in life and careers through a value based, industry relevant and future ready education.
- Emphasize research, interdisciplinary learning, and practical hands on education.
- Equip every student with the required social and technical skills to achieve employment generation.
- Provide a holistic education deeply rooted in the ways of the traditional Gurukul system.
- Bring quality education within the reach of every individual, by committing to the achievement and maintenance of excellence in education, research and innovation.
- Create and disseminate knowledge through research and creative inquiry.
- Serve students by teaching them problem solving, leadership and teamwork skills, lateral thinking, commitment to quality and ethical behaviour.
- Create a diverse community, open to the exchange of ideas, where discovery, creativity, and personal and professional development is encouraged and can flourish.
- Contribute to the social fabric and economic health of the Bundelkhand region, the state and the country at large, by enhancing and facilitating economic empowerment, providing equal opportunities and employment generation.

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VISION STATEMENT OF DEPARTMENT

To establish & develop world class self reliant institute for imparting Medical and other Health Science education at under-graduate, post-graduate & doctoral levels of the global competence.

To serve & educate the public, establish guidelines & treatment protocols to be followed by treating hospitals.

MISSION STATEMENT OF DEPARTMENT

To practice medicine ethically in line with the global standard protocols.

To inculcate high moral, ethical and professional standards among students and to improve their overall personality as well as to inculcate compassionate behaviour.





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School Of Nursing & Paramedical Science

Estd. by Madhya Pradesh Niji Vishwavidyalaya (Bhopal) Awar, Santhoshpur, Achhner, 2020

CERTIFICATE IN X-RAY TECHNICIAN

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

1. The certificate course is designed for students who are desirous of taking up careers in Paramedical Sciences
2. This program is aimed at preparing well- trained, professionals who possess both intellectual and technical rigor of high calibre in the areas of Paramedical .
3. The syllabus is wide ranging and indicates a judicious mix of the theoretical orientation and practical knowledge.
4. The training of the candidate registering for X-Ray Technician certificate course are aimed to carry out all routine diagnostic / therapeutic test on modern hospital laboratory.



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Estd. by Madhya Pradesh Nij Vishwavidyalaya (Shiksha Aram Sanchalanal Achyudesh, 2020)

School Of Nursing & Paramedical Science

CERTIFICATE IN X-RAY TECHNICIAN

PROGRAMME OUTCOMES (POs)

In order to achieve our mission, objectives, and goals the program and its personnel will strive to:

After completing this undergraduate programme, a learner:

- Examine and analyze the nature and seriousness of the patient's condition or extent of injuries to assess the need for emergency medical care, perform appropriate medical care based on assessment findings of the patient's condition, lift, move, position and otherwise handle the patient to minimize discomfort and prevent further injury.
- Demonstrate the roles and responsibilities of a paramedic within an EMS system, perform the basic concepts of development, Perform airway management including oxygenation and ventilation of a patient.
- Demonstrate a proper history and perform a comprehensive physical examination on any patient, and communicate findings to others.
- Demonstrate integration of principles and analyze assessment findings to formulate a field impression and implement the treatment plan for the trauma patient.
- Demonstrate integration of principles and analyze assessment findings to formulate a field impression and implement the treatment plan for neonatal, pediatric and geriatric patients, diverse patients, and chronically ill patients.
- Demonstrate integration of principles and analyze assessment findings to formulate a field impression and implement the treatment plan for patients with common complaints.
- Perform safety management principles at the scene of an emergency.
- Apply general knowledge and understanding of managing an emergency medical services system.

CERTIFICATE IN X-RAY TECHNICIAN
PROGRAMME SPECIFIC OUTCOMES (PSOs)

Students will learn-

- Students will learn the basic anatomy of the body to be able to interpret the parts of the radiogram
- Students will learn the skills required in operating and maintaining radiography equipment like X-ray, CT, DEXA scan and MRI
- Students will be trained to diagnose and treat diseases based on their analysis of various imaging test results
- Students will attain hands-on training from professional radiologists and will assist them in their duties
- On completion of the Imaging Technology course, career progression for the student begins as an Imaging Technologist or Radiology Technician, further moving to the critical areas of being an MRI Technician, CAT Scan Technologist, etc





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Estd. by Madhya Pradesh Jiji Vishwavidyalaya (Bhopal) Avim Santholanaal Aahyodesh, 2020.

School Of Nursing & Paramedical Science

Department of Paramedical

SYLLABUS

CERTIFICATE IN X-RAY TECHNICIAN

1 YEAR CERTIFICATE COURSE

Year	1st year
Subject	ANATOMY & PHYSIOLOGY
Time	190Hrs.

ANATOMY & PHYSIOLOGY

Course Objectives:

1. To understand the definition of anatomy and physiology and their different terms
2. To understand the structure of the cell and their constituents..
3. To understand the systems of anatomical and physiological characters
4. To understand the normal anatomical and their parts and their functions..

Course Outcome:

1. To student should be able to identify & describe Anatomical aspects of muscle bones & joint analyze movements.
2. To understand the Anatomical basis of various clinical conditions e.g. trauma, deformities, spine.
3. To understand & describe the mechanism of posture & gait the Anatomical basis of abnormal
4. To describe various parts of CNS, brain, midbrain, Hind-brain, brain stem, courses of cranial components course distribution. Anatomical basis of clinical lesions.
5. To be able to identify & describe the source & course of circulatory system.

Student Learning Outcomes (SLO):

1. Students will be able to understand the definition of anatomy and physiology and their different terms
2. Students will be able to understand the structure of the cell and their constituents..
3. Students will be able understand the systems of anatomical and physiological characters.
4. Students will be able to understand the normal anatomical and their parts and their functions.

Unit - 1

General anatomical term, Regime of the body, Structure of will and general tissues simple, compound etc. Heart and blood vassals, structure & function of heart, pericardium, peripheral muscular system names of the main arteries and veins circulation, General anatomical term, Regime of the body common terms used in connection with disease of this system.

Unit - 2

Respiratory system , nasal passage and accessory sinuses, pharynx & larynx, trachea, bronchi & lungs, pleura nature & function of respiration common. terms used in connection with disease of this system. Lymphatic system, lymph & tissue fluid, main lymphatic gland groups & drainage, lymphoid tissue and tonsil. Reticule endothelial system, spleen and liver, bone marrow extent and life. cycle of the red and white corpuscles of one blood.

Unit - 3

Alimentary system- mouth, tongue, teeth, salivary glands, pharynx & esophagus, stomach small & large bowel live & billiard tract pancreas , motor. Alimentary system- mouth, tongue, teeth, salivary glands, pharynx & esophagus, stomach small & large bowel live & billiard tract pancreas , motor functions of alimentary tract, nature of food, digestion & absorption, nature & metabolism, nutrition & dietetics , common terms used in connection with disease of this system. Urinary tract kidneys, ureters, bladder & urethra, urinary secretion. Reproductive system- male genital tract, testis, epididymus & prostate, female ,genital tract, fallopian tubes, ovaries, uterus, vagina & vulva, the mammary gland pregnancy common terms used in connections with disease of this system.

Unit - 4

Nervous system- brain, main subdivision & lobes, ventricles, spinal cord, crucial & main system nerve tracts, meaning cerebrospinal fluid, its circulation. autonomic nervous system common terms used in connection with disease of this system.

Unit - 5

Spinal sense organs- structure & function of eye, structure & function of ear. Topographical relation of organs of the neck & trunk elementary pathology. Inflammation, benign & malignant tumors & endocrine disorders.

Mode: Flipped Class Room, Case Discussion, Lectures.

Suggested Reading:

1. Solon on E.A. (2008) Introduction to Human Anatomy and Physiology 3rd Ed. Saunders: St Louis.
2. Chaurasia, B.D. & Garg, K., (2012) Human Anatomy Regional and Applied CBS Publications: New Delhi
3. T.S. Ranganathan - A text book of Human Anatomy
4. Fattana, Human anatomy (Description and applied) Saunder's & C. P. Prism Publishers, Bangalore - 1991
5. W. F. Ganong - Review of Medical Physiology.

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Esttd. by Madhya Pradesh Niji Vishwavidyalaya (Bhopal) Act No. Sanchikaran/Adm/2020.

School Of Nursing & Paramedical Science

Department of Paramedical

SYLLABUS

CERTIFICATE IN X-RAY TECHNICIAN

1 YEAR CERTIFICATE COURSE

Year	1st year
Subject	Radiography-1: Basic Physics, Equipments of Radiodiagnostic Radiography
Time	130Hrs.

Radiography-1: Basic Physics, Equipments of Radiodiagnostic Radiography

Course Objectives:

1. To diagnose basic ideas on measurements, units, mechanical force in radio techniques.
2. To diagnose or treat patients by recording images of the internal structure of the body to assess the presence or absence of disease.
3. To understand fundamentals of radioactivity.
4. To understand principles of mega voltage X-ray machines, Fluoroscopy

Course Outcome:

1. Student will be able to acquire knowledge about the healthcare sector and diagnostic services
2. Student will be able to determine radiological needs of the patient
3. Student will be able to prepare the room & patient for the X-ray scans Perform radiological diagnostic tests
4. Student will be able to ensure radiation safety measures & act accordingly Perform dark room techniques.

Student Learning Outcomes (SLO):

1. Students will be able to demonstrate their ability to perform an appropriate primary/initial assessment of the ill or injured patient in the pre hospital setting.
2. Students will be able to demonstrate their ability to perform an appropriate secondary/focused history and physical exam of the patient in the pre-hospital setting.
3. Students will be able to perform an appropriate secondary/focused history and physical exam for patients .
4. Students will be able to formulate an appropriate treatment plan to patient.

Unit - 1

Basic ideas on measurements & units, mechanical force, work & energy heat temperature & energy, heat conduction, connection & radiation. **ELECTRICITY AND X-RAY APPARATUS:** Electrostatics-Related to X-ray production X-ray valve and tubes- construction of x-ray tubes(inserts and fields filament design, anode design, methods of cooling, simple high tension circuits- self rectified, half wave full wave, H.T. cables, measurement of high tension, control and indicating equipment- control of tube voltage autotransformer mains voltage compensator, methods of tube voltage indication, control of tube current, filament transformer primary and secondary circuits, tube current indication, control of exposure, contactor and basic principles of times, feeder cables, fuses mains switches earthing, insulation , voltage, electrica hazards. **RADIATION PHYSICS:** Outline of atomic structure, electromagnetic radiation waves and quanta, Basic ideas on measurements & units, mechanical force, work & energy heat temperature & energy, heat conduction, connection & radiation.

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Unit - 2

RADIATION PHYSICS: Outline of atomic structure, electromagnetic radiation waves and quantum, general properties of electromagnetic radiation- fundamentals of radioactivity. Light-intensity and quality, spectrum of white light, line spectra, photo electric emission, photocell, fluorescence X-ray, production intensity and quality, continuous and characteristic spectra, effects of variation of tube and current production for therapeutic purposes, X-ray and processes of interaction secondary radiation emission and ionisation transmission of a homogeneous beam through an object, transmission through body tissues, transmission of homogeneous X- ray beams reduction in intensity due to absorption and inverse square law, filtration relative amount of scattered radiation in an X-ray beam during its measurement chemical, simple principles of dose meters, the fluorescent specifications and measurement, KVP, half value layer, routine method of checking quality.

Unit - 3

X-ray PROTECTION: Historical development, permissible exposure, international recommendations for protection of persons exposed to ionising radiation, the protective materials lead, lead- impregnates substances, building materials, lead equivalents and variation with quality, design of of tube and room protection, survey of department personnel Morning. Knowledge of equipment for diagnostic radiography: - High-tension control equipment – Diagnostic H.T. circuits, high tension generators, half wave full wave three phase, condensers discharge, contact voltage high tension switches, control and establishing equipment, tube filament supply, mains compensator mains resistance compensator. X-ray tubes – design, rating and care of X-ray tubes, practical considerations in choice of focus, inherent filtration. MAS meter elementary principles and construction, importance as check on. Radiographic results. Apparatus behaviour and additive tube loading, exposure timers – spring activated, synchronous motor, value (Low-tension ionisation testing timer accuracy). Interlocks and safety devices. Circuits – Simple circuit diagram and illustration of sequence from mains supply to control X-ray exposure bean. Centering devices – mechanical and optical, interaction of X-rays and the body transmission in body tissues.

Unit - 4

Scattered radiation – control of scattered radiation, cones, diaphragm, single and multiple filters grid ratio in relation to KV, construction and operation, focused and non – focused, single stroke reciprocating and oscillating potter – bucky, diaphragms, criss cross grids, stationary grids, use etc. Production of X-ray tubes and high tension circuits for the production of control panel and control safety device and interlocks, basic principles of mega voltage X-ray machines. Fluoroscopy – Tube filtration, diaphragm, tilting couch screen grid and exploratory and control safety devices, compressors, protection, electrical radiographic and mechanical control, use and care of couch accessory fittings.

Unit - 5

Special equipment – body section radiography, apparatus and controls simultaneous multi section accessories specialised couches, skull table, mobile units. Image intensifiers, principles, optical systems, for viewing and recording final image electrical and x-ray supply protection, applications, including cine radiography, mass miniature radiography, special radiography, equipment for high speed serial techniques (etc.) rapid cassette changer rapid films changer, roll films, full size and miniature, biplane equipment, grids, protection, problems of processing and presentation, care and maintenance – general principle and routine use of charts supplied by manufactures, radiographic calibration procedure.

Mode: Flipped Class Room, Case Discussion, Lectures.

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Mode: Flipped Class Room, Case Discussion, Lectures.

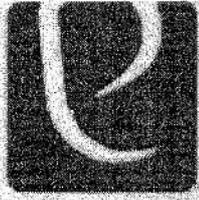
Suggested Reading:

1. Physics for Radiography - Hay and Hughs.
2. Radiographic latent image processing – W. E. J Mckinney .
3. Basic Radiological Physics – Thayalan

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ज्ञान प्राप्तये लक्ष्य संस्थानम्

ESTD. by Marhaya Pradesh Niji Vishwavidyalaya (Uthappa Awar) Barchhalel, Achhmadesh, 2020.

School Of Nursing & Paramedical Science

Department of Paramedical

SYLLABUS

CERTIFICATE IN X-RAY TECHNICIAN (CXRT)

1 YEAR CERTIFICATE COURSE

Year	1st year
Subject	Radiography-2:HOSPITAL PRACTICE & CARE OF PATIENT
Time	95Hrs.

Radiography-2:HOSPITAL PRACTICE & CARE OF PATIENT

Course Objectives:

1. To Practice infection control measures.
2. To explain techniques to maintain the personal hygiene needs.
3. To describe actions in the event of medical and facility emergencies
4. To understand principles ,aspects ,methods of sterilization and care of patient.
5. Identification of instruments and surgical dressings

Course Outcome:

1. Student will be able to practice infection control measures
2. Student will be able to explain techniques to maintain the personal hygiene needs.
3. Student will be able to describe actions in the event of medical and facility emergencies.

Student Learning Outcomes (SLO):

1. Student will be able to assess faults in X-ray machine or process and perform remedial measures.
2. Student will be able to demonstrate troubleshooting skills.
3. Student will be able to demonstrate polite and strategic communication skills, grooming.
4. Student will be able to assess professional etiquettes

Unit - 1

19

Must be conversant with hospital practice and care of patient hospital departmental procedure. Hospital staffing and organisation, records relating to patients and departmental statistics, professional attitude of the radio grapher to patients and other members of the staff, medico legal aspects, minimising waiting time, appointments organisation stock taking and stock keeping. Care of patient: - first contact with patient in the department handling of chair and stretcher patients, lifting of ill and injured patients, elementary hygiene, personal cleanliness, hygiene in relation to patients. E.g. clean Lenin and receptable nursing care, temperature.

Unit - 2

19

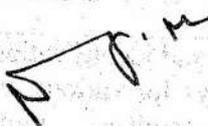
First Aid: - Shock, asphy, convulsions, artificial respiration, electric shock, burns, scalds, haemorrhage, pressure point, tourniquet, fractures, splints, bandaging, foreign bodies, poisons, drug, reactions, administration of oxygen. Preparation of a patient for general X-ray examinations. Departmental instruction to out patients or ward staff, use of aperients, enema and colonic irrigation, flatulence and flatus causes and methods of relief, principles of anaesthetisation and intubations, premeditation, its uses and methods, anaesthetised patients, nursing care before and after special X-ray examinations e.g. in neurological, vascular and respiratory conditions diabetic patients, special attention to food, trauma hazards. Preparation of patients for special x-ray examinations barium enema, barium meal, intravenous pyelography cholecysto graphy etc. and their administration.

Unit - 3

19

Principles and aspects: - Methods of sterilisation, care and identification of instruments and surgical dressings in common use, setting of trays and trolleys for various examinations etc. intravenous pyelography, biopsy, elementary operating theatre produce. Drugs in department- storage, labellings checking, regulations regarding Contrast media- barium preparations, iodine.

Unit - 4	19
Photographic aspects of radiography – the fundamentals of the photographic process, light sensitive salts of silver, the photographic emulsion gelatine as suspension medium, size and frequency of the silver halide grain in relation to sensitivity and contrast, formation of the latent image, chemical development, construction of x-ray film base material, substratum coating, emulsion, coating anti-abrasive super coating sensitivity, storage of unexposed film.	
Unit - 5	19
<p>X-ray materials: - Type of emulsion, characteristics and control screen films, non screen films, dental films, comparative speed and contrast to light and x-rays, Characteristics of x-ray emulsions, characteristics curves of x-ray film assessment of the results of correct exposure under & over exposure, density (D max) speed, contrast (Gamma infinity) graduation, fog, grain, exposure, kilovoltage and developing latitude. Intensifying screens fluorescence application of fluorescence in radiography, construction of an intensifying screen, types of emulsion in relation to type of salt, size of grain, coating, weight, kilovoltage, mounting and general care of screens, after glow test for reciprocity failure, intermittency effect.</p> <p>The X-ray, testing a cassette for proving good screen contact, general case of cassettes. X-ray developers – characteristics and detail freedom from chemical fog and staining, long life possibility of degeneration. Standardisation of quality of developers and development – function and constituents of an x-ray developer, standardisation by time and temperature development latitude, exhaustion of a developer, replenishment of developers, ultra rapid developers, combined developer and fixer, fixers and fixing, hardening agent, time of fixation, exhaustion of a fixer, electrolytic silver recovery and fixer regeneration, rapid fixers, separate hardening. Rinsing, washing and drying – objects of rinsing and washing, methods, employed, methods of drying films, processing – preparation of solutions, available water supply, nature of mixing, vessels, order of mixing solutions, filtration, making stock solutions, storage of dry chemicals, storage of solutions, processing units, hangers, care of hangers, control of temperature by heating elements and thermostat, water mixer, by refrigeration, use of ice – film quality, ultra rapid processing, tank or dish units, stop bath rinse, wetting agents, after treatment of films. Automatic processing principles, procedure and regeneration of solutions.</p>	
# Mode: Flipped Class Room, Case Discussion, Lectures.	
Suggested Reading:	
<ol style="list-style-type: none"> 1. Care of patient in diagnostic Radiography – Chesney & Chesney. 2. Radiographic Imaging - Derrick 3. Physics and photography principles of Medical Radiography – Seeman and Herman 	




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Est'd by Madhya Pradesh Niji Vidyapeethyalyaya (Bhopal) Act No. 5 of 2002, Bhopal, Madhya Pradesh, India.

Department of Paramedical

SYLLABUS

CERTIFICATE IN X-RAY TECHNICIAN

1 YEAR CERTIFICATE COURSE

Year	1 st year
Subject	Radiography-3:DIAGNOSTIC RADIOGRAPHY &RADIOGRAPHIC TECHNIQUE
Time	55Hrs.

Radiography-3:DIAGNOSTIC RADIOGRAPHY &RADIOGRAPHIC TECHNIQUE

Course Objectives:

1. To understand MRI Magnetic Resonance Imaging
2. To explain techniques to maintain the personal hygiene needs.
3. To describe actions in the event of medical and facility emergencies
4. To understand principles ,aspects ,methods of sterilization and care of patient.
5. Identification of instruments and surgical dressings

Course Outcome:

- Student will be able to understand MRI Magnetic Resonance Imaging
1. Student will be able to explain techniques to maintain the personal hygiene needs.
- Student will be able to describe actions in the event of medical and facility emergencies.

Student Learning Outcomes (SLO):

1. Student will be able to assess faults in X-ray machine or process and perform remedial measures.
2. Student will be able to demonstrate troubleshooting skills.
3. Student will be able to demonstrate polite and strategic communication skills, grooming.
4. Student will be able to assess professional etiquettes

Unit – 1

Skeletal system – Upper limit, techniques for whole hand fingers thumb, wrist, joint, carpus, forearm, elbow joint, radio-ulnar joints, lower two thirds humerus, supplementary techniques, carpal tunnel, scaphoid ulnar groove head of radius, supracondylar projections, etc. Lower limb: - Techniques for whole foot, toes, great toes, calcaneum, talocalcaneal, joint, ankle joint lower leg, knee joint, patella, tibial tubercle, lower two thirds femur, supplementary techniques, position for torn ligaments, comprehensive projections for congenital and acquired flat feet, axial projection to include the talocalcaneal and joint, projections, for loose bodies in knee, infrasternal for patella, arthrography, etc. Skull technique for whole skull temporal bones internal auditory meatus sella turcica floor of foramina anterior fossa, jugular foramen magnum orbits, optic foramina, maxillae, zygomatic arches, nasal bones, mandible and temporomandibular joints, etc. Teeth, techniques, occlusal projections, vertical, horizontal extra oral projections edentulous subjects, children supplementary techniques, etc. Nasal sinuses, techniques frontal maxillary sphenoidal sinuses, erect and horizontal projections, contrast media positioning.

Unit – 2

Cardiac vascular system techniques for heart and main vessels, peripheral vessels, supplementary technique selective angiographic, arterial, capillary and venous. Phases of angiography, carotid, vertebral, etc. Cardiac Respiratory system: Upper respiratory passage, techniques for post nasal airway, larynx, trachea, thoracic in supplementary techniques for routine projection, supplementary techniques for anteroposterior, oblique, lord expiration, Valsalva maneuvers, etc.

Unit – 3

Lungs- technique to define fluid levels, effusions, adhesions, oblique lordotic decubitus, projections, supplementary techniques full inspiration and expiration, etc. Diaphragmatic excursion – double exposure technique, fluoroscopy mediastinum techniques, for routine projections, bronchography, danger of anaesthetised larynx inhibition of cough reflex – methods of introducing contrast medium and positioning during the introduction. Precautions for fluoroscopic

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bronchography, danger of anaesthetised larynx inhibition of cough reflex – methods of introducing contrast medium and positioning during the introduction. Precautions for fluoroscopic control. Genit-urinary system: Techniques for plain film for examination, supplementary techniques, erect, lateral and cross projection, inspiration expiration and double exposure technique, IVP techniques, special consideration, time factor variation with different contrast media and pathological conditions, ureteric compression, danger and contra indications, supplementary techniques oblique, lateral, erect, prone and tilt projections, retrograde techniques special consideration position and identification of ureteric catheters, fluoroscopic control.

Unit – 4**11**

Cystography Injection, relaxed and straining techniques: Fistulae, micturating – cystography urethrography, selective renal angiography, etc. Obstetrics and Gynaecology: Radiation .Precaution special consideration in pregnancy. Factors and accessories, compensatory filters, pregnancy techniques for estimation of fetal development, maturity normality, position and multiplicity, placental localisation soft tissue and contrast media techniques, cystography and arteriography reclining lateral projections – pelvimetry, inlet outlet and erect lateral projections, cephalometry, hysterosalpingo graphy, preparation of theatre and departmental procedure, techniques for routine projection, etc. Elementary system: -Techniques for routine projections. Barium swallow Pharynx and esophagus, supplementary techniques, trachea – esophagus fistula, Valhalla maneuver. Barium meal and follow through stomach, small and large intestine, compression technique, appropriate timing of film series, the mucosal pattern, serial exposures supplementary techniques, intestine obstructions, etc.

Unit – 5**11**

Diaphragmatic hernia, perforation, post operative techniques Barium Enema. CT – Principles of CT Basic Physics – Recent developments, applications etc. MRI Magnetic Resonance Imaging – Principle – Physics – Techniques – Types of coils – Basic term used in MRI Operations, Applications, etc. U/S Physics – Types of ultrasound – Techniques of ultrasound scanning in different parts – positioning and filming – Principles of Doppler effect and colour Doppler. Structure of x-ray films- Types of X-ray films, manufacture of films characteristics of X-ray films, safe light – testing, safe light – special sensitivity. Latent image formation – development techniques – factors affecting quality of x-ray films in processing. Testing the safe light. Cassettes for X-ray screen films, construction, intensifying screens. Types & effects, cleaning & maintenance. Factors affecting the quality of Radiography. Artefacts: - Identification, remedial measures. General principles of x-rays, Hazards of Radiation. Protective measures, film processing, Darkroom planning, lighting Air & Ventilation. Types of hangers, composition & function of developer & fixer solution. Disposal of used chemicals, film drying Account of expenditure loading of 70 mm & 100 mm

Mode: Flipped Class Room, Case Discussion, Lectures.

Suggested Reading:

1. Care of patient in diagnostic Radiography – Chesney & Chesney.
2. Radiographic Imaging - Derrick
3. Physics and photography principles of Medical Radiography – Seeman and Herman

List Of Practical -**324Hrs.**

1. Study of human skeleton
2. Study with the help of charts and models of the following system organs
 - (a) Digestive system
 - (b) respiratory system

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- (c) cardio-vascular system
 - (d) urinary system
 - (e) Reproductive system
 - (f) Nervous system
3. Recording of body temperature pulse heart rate blood pressure and ECG.
 4. Test to check the X-ray films and screen contact in the cassette.
 5. Test to check light leakage in the cassette.
 6. Determination of focal spot size diagnostic x-ray tube
 7. K.V and exposure time consistency of MA loading
 8. Consistency of radiation output
 9. Evaluation of total filtration of the tube
 10. Film screening contact testing
 11. Demonstration basic procedure with all radiographic equipment.

