Radiographic Techniques I (Grade 11)

Domain A: Introduction to Electromagnetism
Standard: Students will acquire theoretical concepts of electromagnetism and electricity.

Grade 11
***Benchmark I**:Student will be able to:* • *Summarize the theoretical concepts of Electromagnetism* • *Describe electric currents and electrical distribution* • *Describe electrical measurements and instruments in use*
Student Learning Outcomes
Student will be able to: SLO:RT-11-A-01:Explain the structure of the atom and Isotopes. SLO:RT-11-A-02:Differentiate between ionization and excitation. SLO:RT-11-A-03:List the electric charges and electric introduction-electroscopes. SLO:RT-11-A-04:Describe the capacitance and capacitors, electric current-ampere, volt, resistance and ohms law. SLO:RT-11-A-05:Explain the Circuit laws, energy and power. SLO:RT-11-A-06:Classify the heating effects of electric current. SLO:RT-11-A-07:List Sources of electrical energy. SLO:RT-11-A-08:State Magnetism, the magnetic effect of electric current. SLO:RT-11-A-09:Compile and categorize applications of magnetic effect, electro-magnetic induction, mutual induction and self-induction. SLO:RT-11-A-10:Describe introduction of alternate current (AC), transformer-theory. SLO:RT-11-A-11:List transformer-practical aspects. SLO:RT-11-A-12:Describe A.C. circuits reactance, resonance, impedance SLO:RT-11-A-13:Recognize electrical distribution system in Pakistan. SLO:RT-11-A-14:Describe electrical measuring instruments and measurements.

Domain B: RADIATION PHYSICS

Standard: Students will explore the intricate concepts of electromagnetic radiation and ultrasound waves in clinical medicine.

Grade 11
Benchmark I*:Student will be able to:* ● *Explain atom, electromagnetic radiation and radiation protection.* ● *Describe the theory and applications of x- ray in clinical settings.* ● *Describe use of radionuclides, ultrasound waves, computed tomography and radiotherapy in medicine.*
Student Learning Outcomes
Student will be able to: SLO:RT-11-B-01:Explain structure of atom, electromagnetic radiation theory and its properties. SLO:RT-11-B-02:Define wave theory and quantum theory of radiation. SLO:RT-11-B-03:Discuss visible light and fluorescence. SLO:RT-11-B-04:Enlist the properties of x-rays, their production and interaction with targets. SLO:RT-11-B-05:Describe spectra of x-rays and factors affecting their quantity and intensity. SLO:RT-11-B-06:Describe the thermionic emission of cathode and principle of x-rays tubes. SLO:RT-11-B-07:Enlist practical aspects of x-rays. SLO:RT-11-B-08:Enlist triode valve and semiconductors, cathode ray oscilloscopes. SLO:RT-11-B-09:Describe x-ray control, X-ray tube voltage (kV.), X-Ray tube current (MA). SLO:RT-11-B-10:Exposure controls. 21. Interaction of x and gamma rays with matter. SLO:RT-11-B-11:Describe the transmission of a homogeneous and heterogeneous beam through a medium and filtration, its absorption and scattering process SLO:RT-11-B-12:Describe radiation protection, maximum permissible dose, protective materials and radiation. SLO:RT-11-B-13:Enlist radionuclides in medical use and their properties SLO:RT-11-B-14:Describe physics of ultrasound-nature, generation, power and intensity. SLO:RT-11-B-15:Describe physical basis of tomography-introduction. SLO:RT-11-B-16:Describe Computed tomography. SLO:RT-11-B-17:Describe physics of magnetic resonance imaging.

SLO:RT-11-B-18:Enlist uses and types of laser and safety precaution concepts of radiotherapy

Domain C: FILMS AND DARK ROOM TECHNIQUES
Standard: Student will explore the scientific methods for the use of x rays and their interactions with material and human body.

Grade 11
Benchmark I*:Student will be able to:* ● *Explain the image formation and x ray interaction with the human body.* ● *Describe the x-ray films and their interactions.* ● *Describe the use of computers in radiological imaging and other processes to manage the imaging department.*
Student Learning Outcomes
Student will be able to: SLO:RT-11-C-01:Describe image formation, distortion and blurring. SLO:RT-11-C-02:Enlist composition and constituents of x-ray films. SLO:RT-11-C-03:Describe effects of x-rays on x-ray film-sensitivity. SLO:RT-11-C-04:Enlist methods of storage of films. SLO:RT-11-C-05:Enlist the fluorescent materials and their uses. SLO:RT-11-C-06:Apply Care and safety of screens and x-rays cassettes. SLO:RT-11-C-07:Perform variation of films and screens with patient's thickness and an anatomical structure. SLO:RT-11-C-08:Describe focal film distance, speed of films, speed of screens. SLO:RT-11-C-09:Enlist steps of film labeling and identification, sizes etc. SLO:RT-11-C-10:Enlist the steps of film development with manual and automatic techniques and identify defects in them. SLO:RT-11-C-11:Introduction to automatic developers, materials used. SLO:RT-11-C-12:Enlist types of contrast media, official and trade names. SLO:RT-11-C-13:Enlist side effects and treatment of reactions from contrast media.

SLO:RT-11-C-14:Enlist types of films used in ultrasound methods of storing.
SLO:RT-11-C-15:Define use of computers in recording and storage of images.
SLO:RT-11-C-16:Enlist store keeping, inventory, ordering and reordering steps in radiology