

Model Curriculum

Radiology Technician

< Radiology Technician >

SECTOR: **Healthcare**
SUB-SECTOR: **Allied Health & Paramedics**
OCCUPATION: **Radiology Technician**
REFERENCE ID: **HSS/Q0201, version 1.0**
NSQF LEVEL: **4**

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Radiology Technician

CURRICULUM / SYLLABUS

This program is aimed at training candidates for the job of a “Radiology Technician”, in the “Healthcare” Sector/Industry and aims at building the following key competencies amongst the learner

Program Name	< Radiology Technician >		
Qualification Pack Name & Reference ID.	HSS/Q 0201, version 1.0		
Version No.	1.0	Version Update Date	11 – 06 – 2016
Pre-requisites to Training	Class XII in Science Or Level 3 X Ray Technician with experience of minimum 3 Years		
Training Outcomes	<p>After completing this programme, participants will be able to:</p> <ul style="list-style-type: none"> • Demonstrate performing diagnostic imaging examinations such as X ray , CT and MRI scans under the guidance of a radiologist. • Demonstrate preparing patients for radiological scans • Demonstrate to understand and determine radiological needs of the patient • Demonstrate to prepare the room & patient for the procedure • Demonstrate radiological safety measures • Demonstrate knowledge about dark room techniques • Demonstrate to assess faults in Radiographs and remedy (Machine know how) • Demonstrate polite and strategic communication skills, grooming skills, professional etiquettes and leadership qualities. • Demonstrate skills to Radiography techniques & positioning • Demonstrate skills to manage patient, department in radiological field <p><small>*All standards, procedures and equipment should comply with Atomic Energy Regulatory Board(AERB) regulations and rules</small></p>		

This course encompasses 14 out of 14 National Occupational Standards (NOS) of “Radiology Technician” Qualification Pack issued by “SSC: Healthcare Sector Skill Council”.

Sr. No.	Module	Theory Duration (hh:mm)	Practical Duration (hh:mm)	Key Learning Outcomes	Corresponding NOS Code	Equipment Required
1	Introduction to Healthcare System	05:00	05:00	<ul style="list-style-type: none"> • Basic understanding of Healthcare Service Providers (primary, secondary & tertiary) • Basic understanding of hospital functions • Basic understanding of Radiology Technician 	Introduction	Visit to Healthcare Facility



				<ul style="list-style-type: none"> • Understanding of Radiology Department at different level (National / State / District) 		
2	Introduction To Human Body; Structure & Function	15:00	15:00	<ul style="list-style-type: none"> • Basic understanding of anatomic definitions, cells and tissues of human body. • Basic understanding of all the body systems and its functions. • Basic understanding of different fluid compartments in human body. • Basic understanding of various membrane transport mechanisms in human body. • To know about anatomical positions & planes • To learn about terminology for Limbs, Movement and Bony Feature • To know about the Skeleton- Bone-Composition Physical Properties Function Classification Parts blood and Nerve Supply Ossification and Development of Bones, Anatomy as a whole, Skeleton-bones & joints, formation of bones, structure of bones, classification of bones according to shape, Developmental classification, Regional classification, structural classification & growth of skeleton • To learn about joints classification cartilage Composition Types • To learn about the Skull – Function, Bones, Nasal Cavity, Vertebral Column • To learn about the Circulatory System Anatomy and Physiology Pulmonary Circulation Lymphatic System • To learn about the Respiratory System Anatomy Of Nose , Pharynx, larynx, Trachea , Lung, 	HSS/ N 0201	Charts, Diagrams, models, e-module



				<p>Physiology</p> <ul style="list-style-type: none"> • To learn about the Digestive System Anatomy Pancreas Liver Physiology • To learn about the Excretory System Kidneys Ureters Urinary Bladder urethra Formation and Excretion of Urine • To learn about the reproductive System : Male Reproductive System & Female Reproductive System • To learn about the Endocrine System Endocrine Glands Pituitary , Thyroid gland Pancreas • To learn about the Nervous System Neurons and their Function • To learn about Brain Spinal Cord Sensory and Motor System Cranial Nerves • To learn about Sensory System –Skin, Eye, Ear, Nose and Tongue • To learn about basic understanding of congenital malformations, Centre of ossification, type of bone, type of joints. Gross structure of human long bone, parts of young bone. Medico-legal & anthropological aspects of skeletal system, Estimation of age, sex, stature (height) and race. Classification & characters of joints, structural, functional & regional. Applied anatomy of joints, dislocation of joints. embryology, cell division, fertilization, development of embryo, gamete formation, menstrual cycle, formation of germ layers, development of embryonic disc, Placenta, formation of tissues, organs & systems of human body 		
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3	Introduction to Medical Terminology & related equipment's	10:00	05:00	<ul style="list-style-type: none"> To know about commonly used medical terms in radiological field To develop understanding of medical abbreviations. To develop understanding of commonly used medical equipment & terms in radiological department. 	HSS/ N 0201, HSS/ N 0202, HSS/ N 0203, HSS/ N 0204, HSS/ N 0205	Reference's use to learn medical terminologies, use of internet to learn medical terms
4	Orientation to Radiology Department	10:00	10:00	<ul style="list-style-type: none"> Orientation to Radiology Department Orientation to Radio diagnosis Department Orientation to Radiotherapy Department 	Introduction	E-module Visit to Radiology Department
5	Radiation Hazards and Protection	20:00	10:00	<ul style="list-style-type: none"> Introduction to Radiation Hazards Introduction to various radiation units – Roentgen, rad, rem, etc, Dosimetry, various radiation measuring instruments, ICRP recommendations, measurement of X-ray and other radiation, rules of AERB , effects of radiation, radiation hazards, , film badge To develop understanding for biological effect of radiation Orientation to Radiation Protection To develop understanding for Principles and Methods of Radiation To know about AERB related guidelines 	HSS/ N 9608	Patient safety tools such as wheel chairs, trolleys, side rails, PPE
6	Safety & First Aid	20:00	20:00	<ul style="list-style-type: none"> To develop understanding and precautions to ensure patient's safety To develop basic understanding and precautions to ensure sample/screen preservation while transporting Describe common emergency conditions and what to do in medical emergencies Describe basics of first aid 	HSS/N 9606, HSS/N 9603	Patient safety tools such as wheel chairs, trolleys, side rails, PPE, First Aid kit, betadine, cotton, bandages, sanitizers, disinfectants



				<ul style="list-style-type: none"> To develop understanding and precautions to ensure self-safety To learn about disaster management and techniques to deal with it 		etc.
7	Personnel Hygiene	05:00	05:00	<ul style="list-style-type: none"> To develop understanding of the concept of healthy living To develop understanding & procedures of hand hygiene To develop techniques of grooming To be equipped with techniques of use of PPE & radiation safety (lead apron, TLD badges etc) To ensure vaccination against common Infectious Diseases. 	HSS/N 9610, HSS/N 9606	Self learning and understanding Mannequin, chart and poster demonstration, heart impressions for easy learning and understanding
8	Bio Medical Waste Management	05:00	05:00	<ul style="list-style-type: none"> To gain understanding of importance of proper and safe disposal of bio-medical waste & treatment To gain understanding of categories of bio-medical waste To learn about disposal of bio-medical waste – color coding, types of containers, transportation of waste, etc. To gain broad understanding of standards for bio-medical waste disposal To gain broad understanding of means of bio-medical waste treatment To understand the role of an infection control team 	HSS/ N 9609	Different coded color bins, different variety of bio medical waste management, Visit to treatment plan of bio medical waste etc.
9	Patients Right & Environment	05:00	05:00	<ul style="list-style-type: none"> Describe necessary steps taken to ensure safety and comfort to the patient during the procedure Describe importance and 	HSS/ N 0201, HSS/ N 0202	internet use to learn patient rights



				<p>methodology of cleanliness, and hygiene environment in collection space</p> <ul style="list-style-type: none"> • Understand sensitivities involved in patient’s right and responsibilities • Learn Radiology Technician’s role in maintaining patient's rights 		
10	Soft Skills & Communication	05:00	05:00	<ul style="list-style-type: none"> • Understand art of effective communication • Able to handle effective communication with Patients & Family • Able to handle effective Communication with Peers/ colleagues using medical terminology in communication • Learn basic reading and writing skills • Learn sentence formation • Learn grammar and composition • Learn how to enhance vocabulary • Learn problem solving • Understand need for customer service and service excellence in Medical service • Understand work ethics in hospital set up • Learn goal setting, team building, team work, time management, thinking and reasoning & communicating with others • Learn objection handling • Learn Telephone and Email etiquettes • Learn Basic computer working like feeding the data, saving the data and retrieving the data. • Learn to analyze, evaluate and apply the information gathered from observation, experience, reasoning, or communication 	HSS/ N 0201, HSS/ N 0202, HSS/ N 9601	Self-learning and understanding



				<p>to act efficiently</p> <ul style="list-style-type: none"> • Learn planning and organization of work • Learn identification of rapidly changing situations and adapt accordingly • Learn decision making ability 		
11	Radiation Physics & Physics of Diagnostic Radiology	20:00	30:00	<ul style="list-style-type: none"> • To understand the radiological diagnostic needs for patients • To develop understanding about 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 • To develop understanding on Basics: Matter, Energy and different types of energy • To develop understanding about Atomic structure and fundamentals • To develop understanding about Radioactivity • To develop understanding about X-Rays Basics: Hands and soft X-Rays, Production and properties, Continuous and characteristic X-Rays, Quality of X-Rays, Heel effect, Thematic omission • To develop understanding regarding measurement of ionizing radiation: Exposure, Roentgen • To develop understanding about X-Ray Technology: X-Ray tubes ,Different parts of an X-Ray tube, Stationary anode tube, Rotating anode tube, Beam Restrictors, Aperture diagrams, Collimators, Cones and cylinders, Grids and Different Types of Grid • To develop understanding 	HSS/ N 0201	<p>CT Control panel, CT Scan unit/CT Scan equipment, Contrast Medium, MRI Unit, Mammography Unit, Ultrasound Equipment, Intensifying Screen, Xray Films, Darkroom, X ray cassette, Intensifying screen, Image Intensifier/ Scanners, Xray Tube, Mannequins, Charts/videos /elearning modules, examination table, Radiation safety aprons, TLD badges, Lead aprons, Full Body Mannequin – Basic, CPR Mannequin, Airway</p>



				<p>about Effects of X-Ray</p> <ul style="list-style-type: none"> • To develop understanding about Fluorescence • To develop understanding about Phosphorescence • To develop understanding about Luminescence • X-Ray Films: Screens, Intensifying screens, Construction Fluorescents screen, Geometric factors influencing images, Magnification and distortion • To develop understanding about the Structure of Matter • To develop understanding about Electrostatics Current Potential and potential Difference EMF Resistance, Ohm’s Law Conductors, Insulators & Semi-Conductors Electrical power Electrical Energy Electric Capacitor (Condenser) Capacitance • To develop understanding about Magnetism Properties of Magnet Magnetic Permeability and Retentivity magnetic Flux Types of Magnetic Material Electromagnetism Electro Magnetic Induction • To develop understanding about Electric Generator Construction and working DC Generator • To develop understanding about Transformer Types Principle Construction Auto Transformer Power Losses • To develop understanding about Rectification Methods of Rectification Self Rectification Valve –Tube rectification • To develop understanding about Rays Absorbed dose inverse square Law Scattered Radiation Methods to Reduce 		<p>Mannequin, Ambu Bag with Mask (Adult), AED Trainer with Adult Pad, Male Multi Venous IV Arm, Liquid Soap Bottle, Mask – packet, Shoe Cover – packet, Hair Cap – packet</p>
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12	Dark Room Techniques	20:00	30:00	<p>Scattered radiation</p> <ul style="list-style-type: none"> • To understand about Location • To understand about Layout, • To understand Illumination • To understand about related Accessories & apparatus required • To understand about Techniques (film protection, film construction • To learn about the photographic process: Introduction, visible light, images produced by radiation, light sensitive photographic materials • To learn about the Image characteristic: Real and mental images, reflected, transmitted and emitted light images Photographic emulsions. The photographic latent image. Positive process • To learn about the construction of x-ray film & its cross over effect. • To learn about the Sensitometry: Photographic density, characteristic curves, • To learn about the storage of film materials and radiograph; • To learn about the Intensifying screens and cassettes. Luminescence: fluorescence and phosphorescence. • To learn about the Construction of an intensifying screen. • To learn about the Fluorescent materials. Types of intensifying screens • To learn about the types of cassettes • To learn about the Film processing: Development. The nature of development-manual or automatic. The PH scale. 	HSS/ N 0204	<p>Intensifying Screen, Xray Films, Darkroom, X ray cassette, Intensifying screen, Image Intensifier/ Scanners, Xray Tube, Mannequins, Charts/videos /eLearning modules, examination table, Radiation safety aprons, TLD badges, Lead aprons</p>
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				<ul style="list-style-type: none"> • To know about constitution of developing solutions both in manual and automatic processing and properties of developing chemicals. • To learn about film processing: Fixing and role of a fixing solution. Constitution of the fixing solutions and properties of the constituents. Factors affecting the quality of fixer. • To understand about Development procedure, laser & bright procedure. • To learn about the processing equipment: Materials for processing equipment, processors for Manual operation, hangers, control of chemicals temperature by heating and thermostat, immersion heaters as well as cooling methods. • To learn about the type of entry, door design. • To learn about the dark room illuminations - white light and safe lighting 		
13	X-Ray Films	15:00	25:00	<ul style="list-style-type: none"> • To develop understanding about construction of X-Ray Films and Characteristics Curve Density and Contrast Film Unsharpness Film, Fog Types Of Films Packaging and Storage of Films X-ray Cassettes • To develop understanding about Intensifying Screens Construction Phosphorus screen Speed Handling and usage Fluorescent Screens • To develop understanding about Processing of X-Ray Films Manual Processing Developer and Developing solution fixer and Fixing Solution Replenishment Rapid Fixer • To develop understanding 	HSS/ N 0203, HSS/ N 0204	Intensifying Screen, Xray Films, Darkroom, X ray cassette, Intensifying screen, Image Intensifier/ Scanners, Xray Tube, Mannequins, Charts/videos /eLearning modules, examination table



14	Faults in Radiographs and Remedy (Machine know how)	15:00	25:00	<p>about Silver recovery</p> <ul style="list-style-type: none"> To learn about machine parts To learn about related accessories to machine To learn about machine guide given by the manufacturer To be able to find faults in the radiographs To learn for referring cases and screens of utmost priority with related professionals To understand faults in radiographs and remedy To understand to operate and oversee operation of radiologic equipment 	HSS/ N 0203	<p>CT Control panel, CT Scan unit/CT Scan equipment, Contrast Medium, MRI Unit, Mammography Unit, Ultrasound Equipment, Intensifying Screen, Xray Films, Darkroom, X ray cassette, Intensifying screen, Image Intensifier/ Scanners, Xray Tube, Mannequins, Charts/videos /elearning modules, examination table, Radiation safety aprons, TLD badges, Lead aprons</p>
15	Regional Radiography and Contrast Media	25:00	30:00	<ul style="list-style-type: none"> To gain understanding regarding position terminology & projection terminology To understand about Radiography of Chest, KUB region, Biliary Tract To develop understanding about Skull Projections, Various Planes Projection, Terminology Sella- Turcica Optic Foramina Mastoids Petrous bone Paranasal Sinuses Facial Bones 	HSS/ N 0206	<p>CT Control panel, CT Scan unit/CT Scan equipment, Contrast Medium, MRI Unit, Mammography Unit, Ultrasound</p>

				<p>orbits nasal bone Mandible</p> <ul style="list-style-type: none"> To develop understanding about Radiography of upper limb hand Scaphoid Carpal tunnel Wrist fore- arm Shoulder Coracoid process Sternoclavicular joint To develop understanding about Radiography of lower limb foot Calcaneum Subtalar and ankle Joint Leg Knee Joint Patella thigh Hip Joint Pelvis To develop understanding about Radiograph of Cervical Spine To develop understanding about Radiography of Dorsal spine To develop understanding about Radiography of Lumbar, Lumbo Sacral Spine and Coccyx To develop understanding about Contrast Media Intravascular media Adverse Reactions, precautions and treatments Various Contrast Media Contrast Media in Ct, MRI and Ultrasound 		<p>Equipment, Intensifying Screen, Xray Films, Darkroom, contrast medium</p>
16	Recent Imaging and special Diagnostic Procedure	30:00	30:00	<ul style="list-style-type: none"> To learn and understand to prepare the patient and the room for the procedure To develop understanding regarding Ultrasound Scanning principal Display of images, modes Doppler ultrasound duplex ultrasound Endosonography To develop understanding about Mammography, Equipment, Positioning and projections To develop understanding about Xero- radiography To develop understanding about Scintigraphy, Radio Nucleides, Equipment To develop understanding 	HSS/ N 0201, HSS/ N 0202, HSS/ N 0203, HSS/ N 0204	<p>CT Control panel, CT Scan unit/CT Scan equipment, Contrast Medium, MRI Unit, Mammography Unit, Ultrasound Equipment, Intensifying Screen, Xray Films, Darkroom, X ray cassette,</p>



				<p>about Alimentary Tract</p> <ul style="list-style-type: none"> • To develop understanding about (Oesophagus) Barium Swallow • To develop understanding about (Stomach & Duodenum) Barium Meal Upper GI Study • To develop understanding about (Small Intestine) Barium Meal Follow through • To develop understanding about (Large Bowel) Barium Enema • To develop understanding about Sialography • To develop understanding about Nasopharyngography • To develop understanding about Tomography • To develop understanding about Laryngography • To develop understanding about Bronchography • To develop understanding about (Biliary Tract) Oral Cholecystography • To develop understanding about Percutaneous Transhepatic Cholangiography • To develop understanding about Per Operative Cholangiography • To develop understanding about Urinary Tract intravenous urography Retrograde Pyelography Antegrade Pyelography Cystography Retrograde urethrography • To develop understanding about Arthrography • To develop understanding about Myelography • To develop understanding about Dacrocystography and orbital Venography • To develop understanding 		<p>Intensifying screen, Image Intensifier/ Scanners, Xray Tube, Mannequins, Charts/videos /learning modules, examination table, Radiation safety aprons, TLD badges, Lead aprons, Full Body Mannequin</p>
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				<p>about Angiography Arteriography Carotid Arteriography Femoral Arteriography Phlebography (Venography)</p> <ul style="list-style-type: none"> To learn to contact vendors and suppliers for maintenance and repair of radiological equipment 		
17	Modern Imaging & Recent Advances	30:00	40:00	<ul style="list-style-type: none"> To learn about its Principles To know about related Equipment To learn regarding examination procedure To know about patient preparation and position To know about recent advances in imaging technology:- Detailed knowledge of ultrasound, colour Doppler, different types of transducers, their principles, applications & role in medicine & cross sectional anatomy. To know about CT scan, conventional, spiral (helical), Multislice:- Historical development, its principle and applications, various generations& definition of terms and cross sectional anatomy& use of diagnostic methods. To know about Magnetic Resonance Imaging (MRI):- Principle, application, its advantage over computed tomography or ultra sonography. Its limitations, uses & cross sectional anatomy. To know about Spectroscopy:- Principle, application and uses. To know about Computerised Radiography:- Principle, application, advantage & technique. 	HSS/ N 0202, HSS/ N 0201, HSS/ N 0203	CT Control panel, CT Scan unit/CT Scan equipment, Contrast Medium, Intensifying Screen, Mannequins, Charts/videos /eLearning modules, MRI Unit, Intensifying screen



				<ul style="list-style-type: none"> To know about Digital Radiography:- Principle, scanned projection radiography, digital subtraction angiography application, definition, advantages & techniques. To know about DSA:- Uses, application, techniques & principle To know about Picture Archiving Communication System (PACS):- Basic knowledge of PACS, application, principle & image transmission. To know about Mammography:- Principle, application, advantage in soft tissue radiography, physics, filtration, QA & QC. 		
18	Post processing techniques	25:00	25:00	<ul style="list-style-type: none"> The equipment for processing X-ray images: <ol style="list-style-type: none"> X-ray Films and X-ray cassettes Intensifying screens X-ray films types structure & quality – choosing films for different studies Dry & wet processing film processing methods - manual and automatic processing of conventional & modern images types & maintenance of processing rooms and image processing equipment systems advantages & disadvantages of day light systems Typical processing faults Production of best quality images in glossy prints and paper prints etc. Uses of intensifying screen, fluorescence and structure of intensifying screens 	HSS/ N 0204	Charts/videos / eLearning modules

				<ul style="list-style-type: none"> To develop understanding about functions and fundamentals of a Dark Room <ol style="list-style-type: none"> Setting up the processing area Dark room design, construction, illumination, entrance safe lighting - types Storage, shelving of films Cleaning and maintenance Explain and implement the fundamentals, concepts and applications of processing of images in digital form using computer based systems To develop understanding about Software post processing: <ul style="list-style-type: none"> Digital image processing techniques in CR & DR To develop understanding about How to read and interpret an X-Ray To know to process radiographic images 		
19	Radiography techniques & Positioning	25:00	25:00	<ul style="list-style-type: none"> To know regarding anatomical terminology To know regarding Positioning terminology To know regarding Projection terminology To know regarding Exposure factors : Millie ampere, Kilovolt age To develop understanding about positioning of the upper limb, Basic alternative and additional projections for Hand. , Fingers, Thumb, Scaphoid, Carpal bones, Carpal tunnel, Wrist, Fore arm, Elbow joint, Homeruns, The Shoulder, Acromio – clavicular joints, Clavicle, Sterna – clavicular joint, Scapula, Bones of the thorax, Ribs, Sternum, The Lower Limb, Foot, Toes, 	HSS/ N 0202	Mannequins, Charts describing various radiographic positions, Charts/videos /eLearning modules, examination table, Radiation safety aprons, TLD badges, Lead aprons



				<p>Cleaners, Ankle joint, Leg, Knee joint, Femur, Hip joint, Pelvis and sacro-iliac joint, Hip joint and upper third of femur, Pelvis, Sacro – iliac joint, The Vertebral column, Cervical Vertebra, Thoracic Vertebra, Lumbar Vertebra, Skull, Mastoid, Paranasal, Facial bone - Maxillae, Mandible, Dental radiography, Lungs/heart and aorta, The abdomen and pelvic cavity, Mammography (only for female candidates)</p> <ul style="list-style-type: none"> • To learn about Chest & Thorax Bones:-Chest-PA, lordotic view(Apicogarm), oblique lateral, thoracic inlet view, decubitus view • To learn about Abdomen:- general preparation of patient, positioning for fluid and air levels, plain film exam, principle advantage, techniques and applications • To learn about Upper limb:- fingers, hands, carpal-tunnel view, wrist-projections, Projections for scaphoid, forearm, elbow, humerus, shoulder joints, acromio-clavicular joint, sterno-clavicular joint, clavicle & scapula. • To learn about Lower limb:- toes, feet, calcaneum, ankle joint, leg bones, different views of knee patella, inter condyler notch, and femur • To learn about Vertebral Column:-Atlanto occipital joint, odontoid, cervical spine, cervico-thoracic spin, dorsal spine, thoraco lumbar spine, lumbosacral spine, sacrum, coccyx, scoliosis, kyphosis, flexion extension, and both 		
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				<p>oblique views of spines.</p> <ul style="list-style-type: none"> To learn about Hips & Pelvis:- Pelvis with both hip joints in different positions, internal and external rotation, frog position, SI Joint. To learn about Ward mobile radiography:-electrical supply, radiation protection, instruction to be followed for portable radiography. To learn about Operation Theatre technique:-General precautions. Asepsis in techniques. Selection of exposure risks, radiation protection. To learn about others related:- Dental radiography, macro & micro radiography, Cine radiography, localization of foreign body, battery operated units (conducer), mass miniature radiography, other emergency radiography 		
20	Machines & Accessories	25:00	25:00	<ul style="list-style-type: none"> To learn to ensure availability of medical and diagnostic supplies To develop understanding about type of X-ray systems To develop understanding about Functionality and advantages and disadvantages To develop understanding about Digital and Analog computerized X-Ray To develop understanding about Selecting and performing basic views (projections) and conventional contrast To develop understanding about Studies using appropriate radiographic parameters and equipment To gain understanding for ensuring availability of medical and diagnostic supplies 	HSS/ N 0203, HSS/ N 0201, HSS/ N 0204, HSS/ N 9611, HSS/ N 9602	Xray Films, Darkroom, X ray cassette, Intensifying screen, Image Intensifier/ Scanners, Xray Tube, Mannequins, Charts/videos /eLearning modules, examination table, Radiation safety aprons, TLD badges, Lead aprons



				<ul style="list-style-type: none"> • To develop understanding about Carrying out routine procedures for : troubleshooting & maintenance • To develop understanding about Breakdown -& how to report a breakdown of imaging and processing systems • To develop understanding about Carry out quality control for automatic film processing, evaluate and act on results • To develop understanding about Quality control - calibration in digital systems • To develop understanding about Special radiographic equipment • To develop understanding about Mobile unit • To develop understanding about Dental unit • To develop understanding about Classical Fluoroscopy units • To develop understanding about C- Arm 		
21	Radiation Safety	20:00	30:00	<ul style="list-style-type: none"> • To understand about radiation safety guidelines • To develop understanding about Code of proactive for the protection of persons against joining radiation, protective materials, lead, lead equivalent, building materials • To develop understanding about Radiation protection devices and personal monitoring devices • To develop understanding about Late and immediate effects of radiation • To develop understanding about Maximum permissible doe (MPD) • To develop understanding 	HSS/ N 0202, HSS/ N 9608	Radiation safety aprons, TLD badges, Lead aprons, Full Body Mannequin – Basic



				<p>about Occupational exposure</p> <ul style="list-style-type: none"> To develop understanding about Occasional exposure To develop understanding about Methods of protection against radiation To develop understanding about Recommended diagnostic installation To develop understanding about Proper protective device To develop understanding about The equipment is satisfactory To develop understanding about The work practices are satisfactory To develop understanding about Radiation protection in fluoroscopic procedure To develop understanding about Advancements in low dose in medical science 		
22	Patient Care, handling & Department Management	10:00	10:00	<ul style="list-style-type: none"> Determine the radiological diagnostic tests required for the patient based on the physician's prescription and the medical history To develop understanding about Procedure to patients - Explaining Do's and Don'ts to the patient To develop understanding about Documentation of patient records: <ol style="list-style-type: none"> Taking the advice of a radiologist on the scans performed Documenting diagnosis and comments of the radiologist in a report for the patient To develop understanding about Explanation of diagnosis and report to patient , if required <ul style="list-style-type: none"> How to handle: Children, Adult, 	<p>HSS/ N 0201, HSS/ N 0205, HSS/ N 0202, HSS/ N 0206, HSS/ N 9610, HSS/ N 9609, HSS/ N 9608, HSS/ N 9606 , HSS/ N 9602</p>	Mock Environment showcasing department, Mannequin, E Modules & Learning Modules



				<p>Women, geriatric</p> <ul style="list-style-type: none"> • To develop understanding about Side effect and reaction of contrast media, classification of reactions of contrast media and treatment of contrast reactions • To develop understanding about Hygiene and waste management on the x-ray department <ul style="list-style-type: none"> ○ Follow the appropriate procedures, policies and protocols for the method of Infection Control in the department • To develop understanding about collection and containment level according to the waste type • To develop understanding about Safety & First Aid <ul style="list-style-type: none"> ○ Steps to make the scan room safe ○ Maintain a first aid kit • To develop understanding about Drugs in the x-ray department • To develop understanding about Maintain availability of medical and diagnostics supply by: inventory management • To develop understanding about Preparation of the patient for special radiological procedure 		
23	Quality Assurance in Radiology	10:00	10:00	<ul style="list-style-type: none"> • To develop understanding about quality control • To develop understanding about periodic testing of the x-ray equipment • To develop understanding about Evaluation of the test results • To develop understanding for maintaining a log about the equipment being tested • To understand the significance 	HSS/ N 0203, HSS/ N 0204, HSS/ N 9611	Internet use for learning and adopting best practices



				<p>of quality, perception & its dimension</p> <ul style="list-style-type: none"> To understand the components of quality system Enumerate the stages & elements quality system Understand the process of quality system To understand the significance of attending CME's for technician To develop a broad understanding regarding <ol style="list-style-type: none"> Hospital Information System Quality Improvement Plan Total Quality Management To understand difference between quality control and assurance To understand the factors which influences quality of care 		
24	Act Within The Limits Of Competence And Authority	05:00	05:00	<ul style="list-style-type: none"> Understand the meaning of relations and types of relationship To understand effective working relationships with the people external to the team, with which the individual works on a regular basis To understand the effect of boundary violation in technician client relationships To understand the code of ethics for radiology technicians 	HSS/ N 9603	Internet use for learning and adopting best practices
25	Work Effectively With Others	05:00	05:00	<ul style="list-style-type: none"> Understand the importance of a team and team work To understand the types of team in health care organization To understand the elements and principles of team work and team based health care Understand how to manage the conflict in health care facility 	Introductory	Internet use for learning and adopting best practices
26	Manage Work To Meet	05:00	05:00	<ul style="list-style-type: none"> To develop broad understanding regarding 	Introductory	Internet use



	Requirements			<p>management of work so as to meet professional expectations</p> <ul style="list-style-type: none"> To understand the significance of keeping the hospital clean To understand the significance of maintaining confidentiality in work environment To understand how to manage stress 		for learning and adopting best practices
27	Consent, Documentation & Records	05:00	05:00	<ul style="list-style-type: none"> Understand guidelines for documentation Learn various types of records of importance for Radiology Technician Understand use and importance of records and consent Understand abbreviations and symbols Enter, transcribe, record, store, or maintain information in written or electronic/magnetic form 	Introductory	Internet use for learning and adopting best practices
28	Basic Computer Knowledge	05:00	05:00	<ul style="list-style-type: none"> To gain broad understanding about application of computers in laboratory Practice Give Introduction to Computers: <ul style="list-style-type: none"> Block diagram Input and Output devices Storage devices Give Introduction to operating systems <ul style="list-style-type: none"> Need of Operating systems (OS) Function of OS Windows 2000 – Utilities and basic operations Microsoft office 2000 – MS Word, MS Excel 	Introductory	Computer/Internet
	Total Duration	<u>395:00</u>	<u>445:00</u>	Unique Equipment Required: computer room, CT Control panel, CT Scan unit/CT Scan equipment, Contrast Medium, MRI Unit, Mammography Unit, Ultrasound Equipment, Intensifying Screen, Xray Films, Darkroom, X ray cassette, Intensifying screen, Image Intensifier/ Scanners, Xray Tube,		



	<p>Total Duration for OJT</p>	<p style="text-align: center;"><u>660:00</u></p>	<p>Mannequins, Charts/videos/eLearning modules, examination table, Radiation safety aprons, TLD badges, Lead aprons, Full Body Mannequin – Basic, CPR Mannequin, Airway Mannequin, Ambu Bag with Mask (Adult), AED Trainer with Adult Pad, Male Multi Venous IV Arm, Liquid Soap Bottle, Mask – packet, Shoe Cover – packet, Hair Cap – packet, Mackintosh, Sand Bag, Fire Extinguisher 5 KG ABC type, Weighing Machine, Duster, Paper (Ream of 500), Cleaning Solution (Colin), Desktop, Intel Core I3, with 2 GB Ram, 500 GB, Hard Disk with accessories with internet facility, T V Monitor 42 Inch LCD TV / LCD Projector, White Board, Extension Cord, Speakers 40 Watt set of two, Printer with Scan and copy function Wi fi with economical printing, dry view for dry procession, modern version of dark room , thyroid shield, fluoroscopy</p> <p>Class Room equipped with following arrangements:</p> <ul style="list-style-type: none"> • Interactive lectures & Discussion • Brain Storming • Charts & Models • Activity • Video presentation • Visit to Primary Health Centre, Hospital set-up
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Grand Total Course Duration: **1500:00 Hours (840 Hours for Class Room & Skill Lab Training + 660 Hours OJT/Internship/Clinical or Laboratory Training)**

*(This syllabus/ curriculum has been approved by **SSC: Healthcare Sector Skill Council**)*



Annexure1: Assessment Criteria

Assessment Criteria for Cardiac Care technician

<u>Job Role</u>	Radiology Technician
<u>Qualification Pack Code</u>	HSS/Q 0201, version 1.0
<u>Sector Skill Council</u>	Healthcare Sector Skill Council

Guidelines for Assessment

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC
3. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below)
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria
5. To pass the Qualification Pack, every trainee should score as per assessment grid.
6. In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack

Skills Practical and Viva (80% weightage)	
	Marks Allotted
Grand Total-1 (Subject Domain)	400
Grand Total-2 (Soft Skills and Communication)	100
Grand Total-(Skills Practical and Viva)	500
Passing Marks (80% of Max. Marks)	400
Theory (20% weightage)	
	Marks Allotted
Grand Total-1 (Subject Domain)	80
Grand Total-2 (Soft Skills and Communication)	20
Grand Total-(Theory)	100
Passing Marks (50% of Max. Marks)	50

Grand Total-(Skills Practical and Viva + Theory)		600			
Overall Result		Criteria is to pass in both theory and practical individually. If fail in any one of them, then candidate is fail			
Detailed Break Up of Marks		Skills Practical & Viva			
Subject Domain		Pick any 2 NOS (2 elements from each NOS each of 100 marks) each of 200 marks totaling 400			
Assessable Outcomes	Assessment Criteria for the Assessable Outcomes	Total Marks (400)	Out Of	Marks Allocation	
				Viva	Skills Practical
1. HSS/ N 0201: Follow radiological diagnostic needs of patients	PC1. Explain the subdivisions of anatomy, terms of location and position, fundamental planes, vertebrate structure of man, organisation of the body cells and tissues	200	50	20	30
	PC2. Explain the pathology of various systems: cardiovascular system, respiratory system, central nervous system, musculoskeletal system, GIT, GUT and reproductive system		20	40	20
	PC3. Explain the pathology of radiation injury and malignancies		20	20	0
	PC4. Understand specific requests of physicians with respect to the scans required		20	10	10
	PC5. Take medical history of the patient and document it as required		30	15	15
	PC6. Understand and interpret instructions and requirements documented by the physician in the patient's prescription		30	20	10
	PC7. Determine the radiological diagnostic tests required for the patient based on the physician's prescription and the medical history		30	20	10
			200	145	95
2.HSS/ N 0202: Prepare the patient and the room for the procedure	PC1. Prepare the room, apparatus and instruments for an x-ray, CT scan or MRI scan	200	10	3	7
	PC2. Set up the X-ray machine, MRI machine or CT scan machine for the procedure		10	4	6
	PC3. Position the patient correctly for an x-ray in the following positions:		10	3	7



a.	Erect		
b.	Sitting		
c.	Supine		
d.	Prone		
e.	Lateral		
f.	Oblique		
g. Decubitus			
PC4. Explain relative positions of x-ray tube and patient and the relevant exposure factors related to these		10	5
PC5. Explain the use of accessories such as Radiographic cones, grid and positioning aids		10	6
PC6. Explain the anatomic and physiological basis of the procedure to be undertaken		10	5
PC7. Explain the radiographic appearances of both normal and common abnormal conditions where elementary knowledge of the pathology involved would ensure application of the appropriate radiographic technique		10	5
PC8. Position the patient correctly for a Computed Tomography scan		15	5
PC9. Position the patient correctly for an MRI scan		15	7
PC10. Apply modifications in positioning technique for various disabilities and types of subject		10	3
PC11. Explain the use of contrast materials for a CT scan and how to administer them under supervision of a radiologist		10	7
PC12. Explain the use of MRI Contrast agents and how to administer them under supervision of a radiologist		10	6
PC13. Manage a patient with contrast reaction		10	5
PC14. Explain the principles of radiation physics detection and measurement		10	6
PC15. Explain the biological effects of radiation		10	7
PC16. Explain the principles of radiation protection: a. Maximum permissible exposure concept b. Annual dose equivalent limits (ADEL) ALARA concept c. International recommendations and current code of practice for the protection of persons against ionising radiation from medical and dental use		10	6



	<p>PC17. Explain the use of protective materials:</p> <p>a. Lead</p> <p>b. Lead – impregnated substances</p> <p>c. Building materials</p> <p>d. Concept of barriers</p> <p>e. Lead equivalents and variations</p> <p>f. Design of x-ray tubes related to protection.</p> <p>g. Structural shielding design (work-load, use factor, occupancy factor, distance)</p>		10	8	2
	<p>PC18. Explain the instruments of radiation protection, use of gonad shield and practical methods for reducing radiation dose to the patient</p>		10	6	4
	<p>PC19. Ensure protection of self, patients, departmental staff and public from radiation through use of protection instruments and monitoring personnel and the work area</p>		10	6	4
			200	103	97
3. HSS/ N 0203: Operate and oversee operation of radiologic equipment	<p>PC1. Describe the construction and operation of general radiographic equipment</p>	200	20	8	12
	<p>PC2. Describe the construction and operation of advanced imaging equipment including CT and MRI</p>		20	15	5
	<p>PC3. Reliably perform all non-contrast plain Radiography, conventional contrast studies and non-contrast plain radiography in special situations</p>		10	2	8
	<p>PC4. Apply quality control procedures for all radiologic equipment</p>		20	15	5
	<p>PC5. Control and manipulate parameters associated with exposure and processing to produce a required image of desirable quality</p>		20	10	10
	<p>PC6. Practise the procedures employed in producing a radiographic image</p>		10	0	10
	<p>PC7. Describe methods of measuring exposure and doses of radiographic beams</p>		20	15	5
	<p>PC8. Help in administration of correct contrast dosage</p>		20	5	15
	<p>PC9. Discuss and apply radiation protection principles and codes of practice</p>		20	15	5



	PC10. Demonstrate an understanding of processing of images in digital form and be familiar with recent advances in imaging		10	4	6
	PC11. Set up the X-ray machine, MRI machine or CT scan machine for the procedure		10	2	8
	PC12. Carry out routine procedures associated with maintenance of imaging and processing systems		10	2	8
	PC13. Ensure protection of patients, departmental staff and public from radiation through use of protection instruments and monitoring personnel and the work area		10	5	5
			200	98	102
4.HSS/ N 0204: Process radiographic images	PC1. Explain the principles of radiographic imaging	200	30	30	0
	PC2. Apply knowledge of radiographic imaging to the production of radiographs and the assessment of image quality		30	10	20
	PC3. Understand the construction and operation of image processing equipment		20	10	10
	PC4. Control and manipulate parameters associated with exposure and processing to produce a required image of desirable quality		30	15	15
	PC5. Perform X-ray film / image processing techniques (including dark room techniques)		40	10	30
	PC6. Explain and implement the fundamentals, concepts and applications of processing of images in digital form using computer based systems		30	10	20
	PC7. Carry out quality control for automatic film processing, evaluate and act on results		20	5	15
			200	90	110
5.HSS/ N 0205: Prepare and document reports.	PC1. Correctly identify anatomical features on the radiographs and identify some major pathological and traumatic conditions	200	70	30	40
	PC2. Seek the advice of the Radiologist on conditions identified		70	40	30
	PC3. Document the comments and diagnosis of the Radiologist in a report for the patient		60	40	20
			200	110	90
6.HSS/ N 0206: Recognise contrast induced adverse reactions	PC1. Know the patient's medical history	200	40	10	30
	PC2. Select proper agent to be used		30	10	20
	PC3. Promptly recognise and assess the reactions		25	5	20



	PC4. Ensure immediate availability of necessary equipment and drugs in case of reaction		30	10	20
	PC5. Know the correct medications and other treatment options		25	5	20
	PC6. Know the different types of adverse reactions		25	5	20
	PC7. Recognise the contraindications of allergic reactions		25	5	20
			200	50	150
7. HSS/ N 9608: Follow radiation safety guidelines	PC1. Confirm sources of radiation and likely type of exposure for all individuals within the work area	200	20	15	5
	PC2. Apply appropriate assessment methodology suitable for source, type of exposure, dose, level of risk and the recipients' exposure time		30	20	10
	PC3. Confirm that all required procedures and associated safety measures are compliant with current and relevant legislation requirements		20	15	5
	PC4. Determine and assess the appropriateness of the projected radiation dose over a suitable period of time for an individual or key staff and other personnel		30	20	10
	PC5. Record the results of the assessment accurately and in correct format, referencing any monitoring measurements taken to accepted published values to indicate conformance within accepted safety guidance limits for the procedures undertaken within the work practice		20	10	10
	PC6. Communicate and provide information, advice and guidance effectively in the appropriate medium to meet the individuals needs and preferences		20	0	10
	PC7. Report actual and potential risks from radiation, in context, to other healthcare professionals and where appropriate seek assistance and advice		10	5	5
	PC8. Maintain full, accurate and legible records of information and store in correct location in line with current legislation, guidelines, policies and protocols		10	5	5
	PC9. Confirm that all required procedures and associated safety measures are current and compliant with relevant legislation		20	5	15



	PC10. Maintain full, accurate and legible records of information and store in correct location in line with current legislation, guidelines, local policies and protocols		20	10	10
			200	105	85
8. HSS/ N 9610 (Follow infection control policies and procedures)	PC1. Perform the standard precautions to prevent the spread of infection in accordance with organisation requirements		5	0	5
	PC2. Perform the additional precautions when standard precautions alone may not be sufficient to prevent transmission of infection		5	0	5
	PC3. Minimise contamination of materials, equipment and instruments by aerosols and splatter		5	5	0
	PC4. Identify infection risks and implement an appropriate response within own role and responsibility		20	10	10
	PC5. Document and report activities and tasks that put patients and/or other workers at risk		5	0	5
	PC6. Respond appropriately to situations that pose an infection risk in accordance with the policies and procedures of the organization		5	0	5
	PC7. Follow procedures for risk control and risk containment for specific risks		10	0	10
	PC8. Follow protocols for care following exposure to blood or other body fluids as required		10	0	10
	PC9. Place appropriate signs when and where appropriate	200	20	10	10
	PC10. Remove spills in accordance with the policies and procedures of the organization		5	0	5
	PC11. Maintain hand hygiene by washing hands before and after patient contact and/or after any activity likely to cause contamination		5	0	5
	PC12. Follow hand washing procedures		5	0	5
	PC13. Implement hand care procedures		5	0	5
	PC14. Cover cuts and abrasions with water-proof dressings and change as necessary		5	5	0
	PC15. Wear personal protective clothing and equipment that complies with Indian Standards, and is appropriate for the intended use		5	0	5
	PC16. Change protective clothing and gowns/aprons daily, more frequently if soiled and where appropriate, after each patient contact		5	0	5
	PC17. Demarcate and maintain clean and contaminated zones in all aspects of health care work		20	10	10



PC18. Confine records, materials and medicaments to a well-designated clean zone					
PC19. Confine contaminated instruments and equipment to a well-designated contaminated zone					
PC20. Wear appropriate personal protective clothing and equipment in accordance with occupational health and safety policies and procedures when handling waste		5	0	5	
PC21. Separate waste at the point where it has been generated and dispose of into waste containers that are colour coded and identified		5	0	5	
PC22. Store clinical or related waste in an area that is accessible only to authorised persons		5	5	0	
PC23. Handle, package, label, store, transport and dispose of waste appropriately to minimise potential for contact with the waste and to reduce the risk to the environment from accidental release		5	0	5	
PC24. Dispose of waste safely in accordance with policies and procedures of the organisation and legislative requirements		5	5	0	
PC25. Wear personal protective clothing and equipment during cleaning procedures		5	0	5	
PC26. Remove all dust, dirt and physical debris from work surfaces		5	0	5	
PC27. Clean all work surfaces with a neutral detergent and warm water solution before and after each session or when visibly soiled		5	0	5	
PC28. Decontaminate equipment requiring special processing in accordance with quality management systems to ensure full compliance with cleaning, disinfection and sterilisation protocols		5	0	5	
PC29. Dry all work surfaces before and after use		5	0	5	
PC30. Replace surface covers where applicable		5	0	5	
PC31. Maintain and store cleaning equipment		5	5	0	
		200	55	145	
Grand Total-1 (Subject Domain)		400			
Soft Skills and Communication		Pick one field from part 1 randomly and pick one field from part 2 as per NOS of subject domain picked each carrying 50 marks totalling 100			
Assessable Outcomes	Assessment Criteria for the Assessable Outcomes	Total Marks (100)	Out Of	Marks Allocation	
				Viva	Observation/ Role Play



Part 1 (Pick one field randomly carrying 50 marks)					
1. Attitude					
HSS/ N 9603 (Act within the limits of one's competence and authority)	PC1. Adhere to legislation, protocols and guidelines relevant to one's role and field of practice	50	5	1	4
	PC2. Work within organisational systems and requirements as appropriate to one's role		5	2	3
	PC3. Recognise the boundary of one's role and responsibility and seek supervision when situations are beyond one's competence and authority		10	5	5
	PC4. Maintain competence within one's role and field of practice		5	2	3
	PC5. Use relevant research based protocols and guidelines as evidence to inform one's practice		5	2	3
	PC6. Promote and demonstrate good practice as an individual and as a team member at all times		5	3	2
	PC7. Identify and manage potential and actual risks to the quality and safety of practice		10	5	5
	PC8. Evaluate and reflect on the quality of one's work and make continuing improvements		5	2	3
				50	22
Attitude Total		50			
2. Work Management					
HSS/ N 9602 (Ensure availability of medical and diagnostic supplies)	PC1. Maintain adequate supplies of medical and diagnostic supplies	50	10	10	0
	PC2. Arrive at actual demand as accurately as possible		10	6	4
	PC3. Anticipate future demand based on internal, external and other contributing factors as accurately as possible		20	10	10
	PC4. Handle situations of stock-outs or unavailability of stocks without compromising health needs of patients/ individuals		10	10	0
				50	36
3. Attiquete					
HSS/ N 9601 (Collate and Communicate Health Information)	PC1. Respond to queries and information needs of all individuals	50	4	4	0
	PC2. Communicate effectively with all individuals regardless of age, caste, gender, community or other characteristics		10	0	10



	PC3. Communicate with individuals at a pace and level fitting their understanding, without using terminology unfamiliar to them		10	0	10
	PC4. Utilise all training and information at one's disposal to provide relevant information to the individual		10	10	0
	PC5. Confirm that the needs of the individual have been met		4	4	0
	PC6. Adhere to guidelines provided by one's organisation or regulatory body relating to confidentiality		4	4	0
	PC7. Respect the individual's need for privacy		4	4	0
	PC8. Maintain any records required at the end of the interaction		4	4	0
			50	30	20
Work Management Total		50			

Part 2 (Pick one field as per NOS marked carrying 50 marks)

1. Safety management

HSS/ N 9606 (Maintain a safe, healthy, and secure working environment)	PC1. Identify individual responsibilities in relation to maintaining workplace health safety and security requirements	50	6	2	4
	PC2. Comply with health, safety and security procedures for the workplace		4	0	4
	PC3. Report any identified breaches in health, safety, and security procedures to the designated person		4	3	1
	PC4. Identify potential hazards and breaches of safe work practices		6	4	2
	PC5. Correct any hazards that individual can deal with safely, competently and within the limits of authority		6	4	2
	PC6. Promptly and accurately report the hazards that individual is not allowed to deal with, to the relevant person and warn other people who may get affected		6	4	2
	PC7. Follow the organisation's emergency procedures promptly, calmly, and efficiently		6	2	4
	PC8. Identify and recommend opportunities for improving health, safety, and security to the designated person		6	4	2
	PC9. Complete any health and safety records legibly and accurately		6	2	4
				50	25



2. Waste Management						
HSS/ N 9609 (Follow biomedical waste disposal protocols)	PC1. Follow the appropriate procedures, policies and protocols for the method of collection and containment level according to the waste type	50	6	2	4	
	PC2. Apply appropriate health and safety measures and standard precautions for infection prevention and control and personal protective equipment relevant to the type and category of waste		8	4	4	
	PC3. Segregate the waste material from work areas in line with current legislation and organisational requirements		4	0	4	
	PC4. Segregation should happen at source with proper containment, by using different colour coded bins for different categories of waste		8	4	4	
	PC5. Check the accuracy of the labelling that identifies the type and content of waste		4	2	2	
	PC6. Confirm suitability of containers for any required course of action appropriate to the type of waste disposal		4	4	0	
	PC7. Check the waste has undergone the required processes to make it safe for transport and disposal		4	4	0	
	PC8. Transport the waste to the disposal site, taking into consideration its associated risks		4	4	0	
	PC9. Report and deal with spillages and contamination in accordance with current legislation and procedures		4	4	0	
	PC10. Maintain full, accurate and legible records of information and store in correct location in line with current legislation, guidelines, local policies and protocols		4	4	0	
		50	32	18		
HSS/ N 9611: Monitor and assure quality	PC1. Conduct appropriate research and analysis	50	6	2	4	
	PC2. Evaluate potential solutions thoroughly		8	4	4	



	PC3. Participate in education programs which include current techniques, technology and trends pertaining to the dental industry	4	0	4
	PC4. Read Dental hygiene, dental and medical publications related to quality consistently and thoroughly	8	4	4
	PC5. Report any identified breaches in health, safety, and security procedures to the designated person	4	2	2
	PC6. Identify and correct any hazards that he/she can deal with safely, competently and within the limits of his/her authority	4	4	0
	PC7. Promptly and accurately report any hazards that he/she is not allowed to deal with to the relevant person and warn other people who may be affected	4	4	0
	PC8. Follow the organisation's emergency procedures promptly, calmly, and efficiently	4	4	0
	PC9. Identify and recommend opportunities for improving health, safety, and security to the designated person	4	4	0
	PC10. Complete any health and safety records legibly and accurately	4	4	0
		50	32	18
Grand Total-2 (Soft Skills and Communication)		100		
Detailed Break Up of Marks			Theory	
Subject Domain			Select each NOS each carrying different marks totalling 80	
Assessable Outcomes	Assessment Criteria for the Assessable Outcomes	Total Marks (80)		
1. HSS/ N 0201: Follow radiological diagnostic needs of patients	PC1. Explain the subdivisions of anatomy, terms of location and position, fundamental planes, vertebrate structure of man, organisation of the body cells and tissues	12		
	PC2. Explain the pathology of various systems: cardiovascular system, respiratory system, central nervous system, musculoskeletal system, GIT, GUT and reproductive system			



	<p>PC3. Explain the pathology of radiation injury and malignancies</p> <p>PC4. Understand specific requests of physicians with respect to the scans required</p> <p>PC5. Take medical history of the patient and document it as required</p> <p>PC6. Understand and interpret instructions and requirements documented by the physician in the patient’s prescription</p> <p>PC7. Determine the radiological diagnostic tests required for the patient based on the physician’s prescription and the medical history</p>	
<p>2.HSS/ N 0202: Prepare the patient and the room for the procedure</p>	<p>PC1. Prepare the room, apparatus and instruments for an x-ray, CT scan or MRI scan</p> <p>PC2. Set up the X-ray machine, MRI machine or CT scan machine for the procedure</p> <p>PC3. Position the patient correctly for an x-ray in the following positions:</p> <ul style="list-style-type: none"> a. Erect b. Sitting c. Supine d. Prone e. Lateral f. Oblique g. Decubitus <p>PC4. Explain relative positions of x-ray tube and patient and the relevant exposure factors related to these</p> <p>PC5. Explain the use of accessories such as Radiographic cones, grid and positioning aids</p> <p>PC6. Explain the anatomic and physiological basis of the procedure to be undertaken</p> <p>PC7. Explain the radiographic appearances of both normal and common abnormal conditions where elementary knowledge of the pathology involved would ensure application of the appropriate radiographic technique</p> <p>PC8. Position the patient correctly for a Computed Tomography scan</p> <p>PC9. Position the patient correctly for an MRI scan</p>	<p>10</p>



	<p>PC10. Apply modifications in positioning technique for various disabilities and types of subject</p> <p>PC11. Explain the use of contrast materials for a CT scan and how to administer them under supervision of a radiologist</p> <p>PC12. Explain the use of MRI Contrast agents and how to administer them under supervision of a radiologist</p> <p>PC13. Manage a patient with contrast reaction</p> <p>PC14. Explain the principles of radiation physics detection and measurement</p> <p>PC15. Explain the biological effects of radiation</p> <p>PC16. Explain the principles of radiation protection: a. Maximum permissible exposure concept b. Annual dose equivalent limits (ADEL) ALARA concept c. International recommendations and current code of practice for the protection of persons against ionising radiation from medical and dental use</p> <p>PC17. Explain the use of protective materials: a. Lead b. Lead – impregnated substances c. Building materials d. Concept of barriers e. Lead equivalents and variations f. Design of x-ray tubes related to protection. g. Structural shielding design (work-load, use factor, occupancy factor, distance</p> <p>PC18. Explain the instruments of radiation protection, use of gonad shield and practical methods for reducing radiation dose to the patient</p> <p>PC19. Ensure protection of self, patients, departmental staff and public from radiation through use of protection instruments and monitoring personnel and the work area</p>	
<p>3. HSS/ N 0203: Operate and oversee operation of radiologic equipment</p>	<p>PC1. Describe the construction and operation of general radiographic equipment</p> <p>PC2. Describe the construction and operation of advanced imaging equipment including CT and MRI</p> <p>PC3. Reliably perform all non-contrast plain Radiography, conventional contrast studies and non-contrast plain radiography in special situations</p> <p>PC4. Apply quality control procedures for all radiologic equipment</p>	<p>10</p>



	<p>PC5. Control and manipulate parameters associated with exposure and processing to produce a required image of desirable quality</p> <p>PC6. Practise the procedures employed in producing a radiographic image</p> <p>PC7. Describe methods of measuring exposure and doses of radiographic beams</p> <p>PC8. Help in administration of correct contrast dosage</p> <p>PC9. Discuss and apply radiation protection principles and codes of practice</p> <p>PC10. Demonstrate an understanding of processing of images in digital form and be familiar with recent advances in imaging</p> <p>PC11. Set up the X-ray machine, MRI machine or CT scan machine for the procedure</p> <p>PC12. Carry out routine procedures associated with maintenance of imaging and processing systems</p> <p>PC13. Ensure protection of patients, departmental staff and public from radiation through use of protection instruments and monitoring personnel and the work area</p>	
<p>4.HSS/ N 0204: Process radiographic images</p>	<p>PC1. Explain the principles of radiographic imaging</p> <p>PC2. Apply knowledge of radiographic imaging to the production of radiographs and the assessment of image quality</p> <p>PC3. Understand the construction and operation of image processing equipment</p> <p>PC4. Control and manipulate parameters associated with exposure and processing to produce a required image of desirable quality</p> <p>PC5. Perform X-ray film / image processing techniques (including dark room techniques)</p> <p>PC6. Explain and implement the fundamentals, concepts and applications of processing of images in digital form using computer based systems</p> <p>PC7. Carry out quality control for automatic film processing, evaluate and act on results</p>	10
<p>5.HSS/ N 0205: Prepare and document reports</p>	<p>PC1. Correctly identify anatomical features on the radiographs and identify some major pathological and traumatic conditions</p> <p>PC2. Seek the advice of the Radiologist on conditions identified</p> <p>PC3. Document the comments and diagnosis of the Radiologist in a report for the patient</p>	10



6.HSS/ N 0206: Recognise contrast induced adverse reactions	PC1. Know the patient’s medical history	10
	PC2. Select proper agent to be used	
	PC3. Promptly recognise and assess the reactions	
	PC4. Ensure immediate availability of necessary equipment and drugs in case of reaction	
	PC5. Know the correct medications and other treatment options	
	PC6. Know the different types of adverse reactions	
	PC7. Recognise the contraindications of allergic reactions	
7. HSS/ N 9608: Follow radiation safety guidelines	PC1. Confirm sources of radiation and likely type of exposure for all individuals within the work area	12
	PC2. Apply appropriate assessment methodology suitable for source, type of exposure, dose, level of risk and the recipients' exposure time	
	PC3. Confirm that all required procedures and associated safety measures are compliant with current and relevant legislation requirements	
	PC4. Determine and assess the appropriateness of the projected radiation dose over a suitable period of time for an individual or key staff and other personnel	
	PC5. Record the results of the assessment accurately and in correct format, referencing any monitoring measurements taken to accepted published values to indicate conformance within accepted safety guidance limits for the procedures undertaken within the work practice	
	PC6. Communicate and provide information, advice and guidance effectively in the appropriate medium to meet the individuals needs and preferences	
	PC7. Report actual and potential risks from radiation, in context, to other healthcare professionals and where appropriate seek assistance and advice	
	PC8. Maintain full, accurate and legible records of information and store in correct location in line with current legislation, guidelines, policies and protocols	



	<p>PC9. Confirm that all required procedures and associated safety measures are current and compliant with relevant legislation</p> <p>PC10. Maintain full, accurate and legible records of information and store in correct location in line with current legislation, guidelines, local policies and protocols</p>	
<p>8. HSS/ N 9610 (Follow infection control policies and procedures)</p>	<p>PC1. Perform the standard precautions to prevent the spread of infection in accordance with organisation requirements</p> <p>PC2. Perform the additional precautions when standard precautions alone may not be sufficient to prevent transmission of infection</p> <p>PC3. Minimise contamination of materials, equipment and instruments by aerosols and splatter</p> <p>PC4. Identify infection risks and implement an appropriate response within own role and responsibility</p> <p>PC5. Document and report activities and tasks that put patients and/or other workers at risk</p> <p>PC6. Respond appropriately to situations that pose an infection risk in accordance with the policies and procedures of the organization</p> <p>PC7. Follow procedures for risk control and risk containment for specific risks</p> <p>PC8. Follow protocols for care following exposure to blood or other body fluids as required</p> <p>PC9. Place appropriate signs when and where appropriate</p> <p>PC10. Remove spills in accordance with the policies and procedures of the organization</p> <p>PC11. Maintain hand hygiene by washing hands before and after patient contact and/or after any activity likely to cause contamination</p> <p>PC12. Follow hand washing procedures</p> <p>PC13. Implement hand care procedures</p> <p>PC14. Cover cuts and abrasions with water-proof dressings and change as necessary</p> <p>PC15. Wear personal protective clothing and equipment that complies with Indian Standards, and is appropriate for the intended use</p> <p>PC16. Change protective clothing and gowns/aprons daily, more frequently if soiled and where appropriate, after each patient contact</p> <p>PC17. Demarcate and maintain clean and contaminated zones in all aspects of health care work</p>	<p>6</p>



	PC18. Confine records, materials and medicaments to a well-designated clean zone	
	PC19. Confine contaminated instruments and equipment to a well-designated contaminated zone	
	PC20. Wear appropriate personal protective clothing and equipment in accordance with occupational health and safety policies and procedures when handling waste	
	PC21. Separate waste at the point where it has been generated and dispose of into waste containers that are colour coded and identified	
	PC22. Store clinical or related waste in an area that is accessible only to authorised persons	
	PC23. Handle, package, label, store, transport and dispose of waste appropriately to minimise potential for contact with the waste and to reduce the risk to the environment from accidental release	
	PC24. Dispose of waste safely in accordance with policies and procedures of the organisation and legislative requirements	
	PC25. Wear personal protective clothing and equipment during cleaning procedures	
	PC26. Remove all dust, dirt and physical debris from work surfaces	
	PC27. Clean all work surfaces with a neutral detergent and warm water solution before and after each session or when visibly soiled	
	PC28. Decontaminate equipment requiring special processing in accordance with quality management systems to ensure full compliance with cleaning, disinfection and sterilisation protocols	
	PC29. Dry all work surfaces before and after use	
	PC30. Replace surface covers where applicable	
	PC31. Maintain and store cleaning equipment	
Grand Total-1 (Subject Domain)		80
Soft Skills and Communication		Select each part each carrying 10 marks totalling 20
National Occupational Standards (NOS)	Performance Criteria (PC)	Total Marks (20)
Part 1 (Pick one field randomly carrying 50 marks)		



1. Attitude		
HSS/ N 9603 (Act within the limits of one's competence and authority)	PC1. Adhere to legislation, protocols and guidelines relevant to one's role and field of practice	3
	PC2. Work within organisational systems and requirements as appropriate to one's role	
	PC3. Recognise the boundary of one's role and responsibility and seek supervision when situations are beyond one's competence and authority	
	PC4. Maintain competence within one's role and field of practice	
	PC5. Use relevant research based protocols and guidelines as evidence to inform one's practice	
	PC6. Promote and demonstrate good practice as an individual and as a team member at all times	
	PC7. Identify and manage potential and actual risks to the quality and safety of practice	
	PC8. Evaluate and reflect on the quality of one's work and make continuing improvements	
Total		
2. Work Management		
HSS/ N 9602 (Ensure availability of medical and diagnostic supplies)	PC1. Maintain adequate supplies of medical and diagnostic supplies	4
	PC2. Arrive at actual demand as accurately as possible	
	PC3. Anticipate future demand based on internal, external and other contributing factors as accurately as possible	
	PC4. Handle situations of stock-outs or unavailability of stocks without compromising health needs of patients/ individuals	
Total		
3. Attiquete		
HSS/ N 9601 (Collate and Communicate Health Information)	PC1. Respond to queries and information needs of all individuals	3
	PC2. Communicate effectively with all individuals regardless of age, caste, gender, community or other characteristics	
	PC3. Communicate with individuals at a pace and level fitting their understanding, without using terminology unfamiliar to them	
	PC4. Utilise all training and information at one's disposal to provide relevant information to the individual	
	PC5. Confirm that the needs of the individual have been met	
	PC6. Adhere to guidelines provided by one's organisation or regulatory body relating to confidentiality	
	PC7. Respect the individual's need for privacy	
	PC8. Maintain any records required at the end of the interaction	



		Total
Part 1 Total		
Part 2 (Pick one field as per NOS marked carrying 50 marks)		
1. Team Work (Evaluate with NOS: HSS/N/0304, 0305, 0306, 0307)		
2. Safety management (Evaluate with NOS: HSS/N/0301, 0302, 0303, 0409, 9610)		
HSS/ N 9606 (Maintain a safe, healthy, and secure working environment)	PC1. Identify individual responsibilities in relation to maintaining workplace health safety and security requirements	3
	PC2. Comply with health, safety and security procedures for the workplace	
	PC3. Report any identified breaches in health, safety, and security procedures to the designated person	
	PC4. Identify potential hazards and breaches of safe work practices	
	PC5. Correct any hazards that individual can deal with safely, competently and within the limits of authority	
	PC6. Promptly and accurately report the hazards that individual is not allowed to deal with, to the relevant person and warn other people who may get affected	
	PC7. Follow the organisation’s emergency procedures promptly, calmly, and efficiently	
	PC8. Identify and recommend opportunities for improving health, safety, and security to the designated person	
	PC9. Complete any health and safety records legibly and accurately	
Total		
3. Waste Management (Evaluate with NOS: HSS/N/5105, 5108, 5114, 5115)		
HSS/ N 9609 (Follow biomedical waste disposal protocols)	PC1. Follow the appropriate procedures, policies and protocols for the method of collection and containment level according to the waste type	4
	PC2. Apply appropriate health and safety measures and standard precautions for infection prevention and control and personal protective equipment relevant to the type and category of waste	
	PC3. Segregate the waste material from work areas in line with current legislation and organisational requirements	
	PC4. Segregation should happen at source with proper containment, by using different colour coded bins for different categories of waste	
	PC5. Check the accuracy of the labelling that identifies the type and content of waste	



	PC6. Confirm suitability of containers for any required course of action appropriate to the type of waste disposal	
	PC7. Check the waste has undergone the required processes to make it safe for transport and disposal	
	PC8. Transport the waste to the disposal site, taking into consideration its associated risks	
	PC9. Report and deal with spillages and contamination in accordance with current legislation and procedures	
	PC10. Maintain full, accurate and legible records of information and store in correct location in line with current legislation, guidelines, local policies and protocols	
	Total	
4. Quality Assurance		
HSS/ N 9611: Monitor and assure quality	PC1. Conduct appropriate research and analysis	3
	PC2. Evaluate potential solutions thoroughly	
	PC3. Participate in education programs which include current techniques, technology and trends pertaining to the dental industry	
	PC4. Read Dental hygiene, dental and medical publications related to quality consistently and thoroughly	
	PC5. Report any identified breaches in health, safety, and security procedures to the designated person	
	PC6. Identify and correct any hazards that he/she can deal with safely, competently and within the limits of his/her authority	
	PC7. Promptly and accurately report any hazards that he/she is not allowed to deal with to the relevant person and warn other people who may be affected	
	PC8. Follow the organisation's emergency procedures promptly, calmly, and efficiently	
	PC9. Identify and recommend opportunities for improving health, safety, and security to the designated person	
	PC10. Complete any health and safety records legibly and accurately	
Part 2 Total	10	
Grand Total-2 (Soft Skills and Communication)	20	20

Annexure2: Trainer Prerequisites for Job role: “Radiology Technician” mapped to Qualification Pack: “HSS/Q0201, version 1.0”

Sr. No.	Area	Details
1	Description	To deliver accredited training service, mapping to the curriculum detailed above, in accordance with the Qualification Pack “HSS/Q0201”.
2	Personal Attributes	Aptitude for conducting training, and pre/ post work to ensure competent, employable candidates at the end of the training. Strong communication skills, interpersonal skills, ability to work as part of a team; a passion for quality and for developing others; well-organised and focused, eager to learn and keep oneself updated with the latest in the mentioned field.
3	Minimum Educational Qualifications	<ul style="list-style-type: none"> • MBBS doctor with one year experience in Radiology department • or • B.Sc. in Radiology with two years’ experience
4a	Domain Certification	Certified for Job Role: “Radiology Technician” mapped to QP: “HSS/Q0201”version 1.0. with scoring of minimum 80%.
4b	Platform Certification	Recommended that the Trainer is certified for the Job Role: “Trainer”, mapped to the Qualification Pack: “SSC/1402” with scoring of minimum 80%.
5	Experience	<ul style="list-style-type: none"> • Experience in teaching Radiology Technician course (HSS/Q0201, version 1.0) • 5 years of experience for Level 4 certified Radiology Technician (HSS/Q0201, version 1.0)

